Journal of

FORESTRY

MAY 1950

SOCIETY OF AMERICAN FORESTERS 1900

Volume 48
Number 5

INDIAN
FIRE PUMPS Saved His Wheat!

I bought one of your ***INDIAN FIRE PUMPS*** *last spring and already it has saved 19 acres of 50 bu. wheat for me. We carry it right on the combine and want you to know that we could not get along without it.*

H. W. Davis

CHIEF SAYS, "INDIANS ARE THE FINEST EXTINGUISHERS EVER USED!"

The ***INDIAN FIRE PUMPS*** *we have on our trucks are the finest portable extinguishers I have ever used. They are the quickest, most economical means of extinguishing grass, brush, rubbish, awning or roof fires.*

Frank Mitchell*, Chief*

Agents Wanted

Send for catalog telling about INDIAN FIRE PUMPS and what they will do for YOU!

FOR DESCRIPTIVE INFORMATION ON THESE FAMOUS FIRE EXTINGUISHERS WRITE TO

D. B. SMITH & CO. UTICA 2, N. Y.

PACIFIC COAST BRANCHES:

Hercules Equipment & Rubber Co., Inc.
435 Brannan Street
San Francisco 7, California

Roy C. Davis Company
617 East Third Street
Los Angeles, California

Fred E. Barnett Company
2005 S. E. 8th Ave.
Portland, Oregon

Fred E. Barnett Company
608 Spring Street
Klamath Falls, Oregon

Titan Chain Saws Inc.
2789 Fourth Avenue South
Seattle, Washington

L. N. Curtis & Sons
426 West Third Street South
Salt Lake City, Utah

CANADIAN AGENTS:

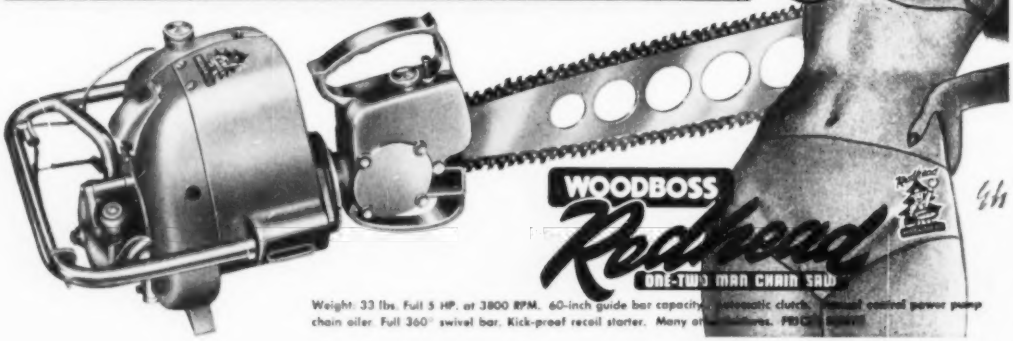
Fleck Bros. Limited
110 Alexander Street
Vancouver, B. C., Canada

Duke Equipment Company, Limited
297 Duke Street
Montreal 3, Canada

THIS "BABE IN THE WOODS" DELIVERS THE GOODS!

Sensational new Woodboss Redhead One-Two Man Chain Saw is a "babe" only in the sense that it's slim, trim and brand new...a real lightweight packed with working power for fast, easy felling and bucking in any kind of timber, big or small. Already, hundreds of timber workers recognize the Redhead as the finest chain saw ever developed. They're saying, "Man! The New Woodboss Redhead is SOME BABY!" Write today for complete details. DEALERS: Inquire about open territories. Address Dept. F-5

WOODBOSS, INC. 1800 S. E. UNION AVE., PORTLAND 14, OREGON
IN CANADA: P-M PRODUCTS (1947) LTD., 847 E. HASTINGS, VANCOUVER, B. C.



Weight: 33 lbs. Full 5 HP. at 3800 RPM. 60-inch guide bar capacity, automatic clutch, manual control power pump chain oiler. Full 360° swivel bar. Kick-proof recoil starter. Many other features. PEDCO power

VOLUME 48 • NUMBER 5 MAY 1950

Journal of Forestry

Editorial Staff

ALBERT G. HALL ..... *Editor*
HENRY CLEPPER ..... *Managing Editor*
L. AUDREY WARREN ..... *Business Manager*

Associate Editors

C. FRANK BROCKMAN, *Forest Recreation*, College of Forestry, University of Washington, Seattle 5, Wash.

ALBERT C. CLINE, *Forest Economics and Policy*, Forest Service, U. S. Department of Agriculture, Washington 25, D. C.

S. R. GEVORKIANTZ, *Mensuration*, Lake States Forest Experiment Station, University Farm, St. Paul 1, Minn.

W. D. HAGENSTEIN, *Forest Management and Engineering*, West Coast Lumbermen's Association, 1410 S. W. Morrison Street, Portland 5, Oreg.

GEORGE H. HEPTING, *Forest Pathology and Entomology*, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Federal Building, Asheville, N. C.

AXEL G. LINDH, *Forest Fire*, Forest Service, U. S. Department of Agriculture, Federal Building, Missoula, Mont.

HERBERT B. MCKEAN, *Forest and Wood Utilization*, Timber Engineering Company, 1319 18th Street N. W., Washington 6, D. C.

CARL E. OSTROM, *Silviculture*, Southeastern Forest Experiment Station, Lake City, Fla.

J. W. B. SISAM, *World Forestry*, Faculty of Forestry, University of Toronto, Toronto, Ont., Canada.

H. G. WILM, *Forest Influences and Soils*, Pacific Northwest Forest and Range Experiment Station, 423 U. S. Court House, Portland 5, Oreg.

LEE E. YEAGER, *Forest-Wildlife Management*, Colorado Cooperative Wildlife Research Unit, 115 Forestry Building, Colorado A & M College, Fort Collins, Colo.

LLOYD THORPE, *Advertising Representative*, 209 Seneca Street, Seattle 1, Wash.

The JOURNAL OF FORESTRY, established in 1917, is the official organ of the Society of American Foresters, but the Society assumes no responsibility for the statements and opinions expressed by contributors.

Publication office, 825 Mills Building, 17th Street at Pennsylvania Avenue N. W., Washington 6, D. C. Address all correspondence concerning editorial or business matters to JOURNAL OF FORESTRY, 825 Mills Building, 17th Street at Pennsylvania Avenue N. W., Washington 6, D. C. Published monthly. Subscriptions, $6 per year; single copies, 60 cents. Missing numbers will be replaced without charge provided claim is made within thirty days after date of the following issue.

The editors are not responsible for loss or damage of manuscripts and photographs while in transit or in their possession. All material submitted for publication should be accompanied by return postage.

Copyright, 1950, by the Society of American Foresters.

Entered as second-class matter at the post office at Washington, D. C. Acceptance for mailing at the special rate of postage provided for in the Act of February 28, 1925, embodied in paragraph 4, Section 412, P. L. and R., authorized November 10, 1927.

Contents

COVER: "Ready to Meet the Insect Enemy," Targhee National Forest, Idaho
Photo by Paul Rieler, U. S. Forest Service

Development of the Cooperative Effort in Forest Pest Control — *W. L. Popham* — 321

Quality of Reproduction Following Partial Cutting of Northern Hardwoods — *W. M. Zillgitt* — 324

Treated Timber in the Coal Mining Industry—Its Application and Economic Justification — *James E. Huffman* — 325

Materials for Protection Against Biting Insects — *B. V. Travis and Carroll N. Smith* — 329

The Mechanical Effects of Fusiform Rust Cankers on Stems of Loblolly Pine — *Karl F. Wenger* — 331

Spot-wise Direct Seeding for Redwood — *Emanuel Fritz* — 334

Needed: A Research Program in Forest Owner Education — *Charles H. Stoddard* — 339

Some Factors Affecting Humus Development in the Northeast — *Richard S. Sartz and William D. Huttinger* — 341

A Method of Forecasting Annual Variation in Seed Crop for Loblolly Pine — *Kenneth B. Trousdell* — 345

Growth of Ponderosa Pine — *Philip A. Briegleb* — 349

The Effect of Repeated Pruning on Diameter and Height Growth of Planted Slash Pine — *William R. Boggess* — 352

Harvest Cuttings in the Southern Piedmont Region — *D. J. Weddell* — 354

A Proposal for Forestry Demonstration Areas Along Highways — *George R. Stewart* — 356

Income Tax Regulations and Long Term Forestry Programs — *E. T. F. Wohlenberg* — 360

The Rehabilitation of the Tillamook Burn — *John B. Woods, Jr.* — 362

Notes — 365

On the History of Forestry; Proposed Rapid Reconnaissance of Forests of the Amazon and Orinoco Basins; Guiding Principles; Possible Soil Restoration on "Overgrazed" Recreational Areas; Latin American Commission; Determining Relative Illumination for Two Overlapping Photos for Maximum Stereoscopic Effect; Caliper for Small Stems; Aluminum Foil Replaces Tree Blazes; Report On a Christmas Tree Thinning Operation.

We Present—John William B. Sisam — 372

Points of View — 374

Federal Participation Means Federal Regulation; Arboriculture Articles Needed; Comments on the Journal's "New Look."

Reviews — 376

ABC's of Photogrammetry; The Natural Vegetation of the Windward and Leeward Islands; The Maple Sugar Book; Some References on Watershed Management; Boden und Wald.

Current Literature — 379

Society Affairs — 380

Forestry News — 387

HERE'S THE SURE LOW-COST WAY TO IMPROVE PINE STANDS

Kill Scrub Trees With Du Pont Ammate®

Years of research and commercial use show that the most effective and economical way to give valuable pine trees a better chance to grow is to destroy scrub hardwoods with "Ammate" weed and brush killer. Forest owners report that treatment with "Ammate" costs only 30 to 40 cents per acre for the chemical; and the returns run up to $3 an acre each year in better growth of timber. "Ammate" destroys blackjack oak, gum, sassafras, elm, willow and other weed trees with little or no resprouting.

GET THIS FREE ILLUSTRATED BOOKLET describing how to improve pine timber stands by killing undesirable trees with Du Pont "Ammate."

DU PONT distributors in your area can supply your "Ammate" requirements. For the free booklet "Improvement of Pine Timber Stands with 'Ammate,'" write Du Pont, Grasselli Chemicals Dept., 5031 Du Pont Bldg., Wilmington 98, Del.

"AMMATE" GIVES YOU ALL THESE ADVANTAGES:

- **Kills roots and tops in one application. Little if any resprouting.**
- **Cost is low; a fraction of a cent per tree for "Ammate" does the job.**
- **Saves labor; not necessary to fell or girdle large trees.**
- **Can be used in slack work periods of fall and winter.**
- **Simple to use as concentrated solution or dry crystals.**
- **Safe to operators; harmless to livestock and wildlife.**
- **No fire hazard, not explosive. Dissolves readily in water.**

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING ...THROUGH CHEMISTRY

Listen to Du Pont "Cavalcade of America"—Tuesday Nights—NBC Network

Journal of Forestry
Official Organ of the Society of American Foresters

Development of the Cooperative Effort in Forest Pest Control[1]

W. L. Popham
Assistant chief, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, U. S. Department of Agriculture, Washington, D. C.

It has been conservatively estimated that during the 10-year period 1934-1943 insects and diseases destroyed 622 million cubic feet of commercial timber annually, a loss that we can ill afford to tolerate in the future. These figures do not tell the whole story. Too frequently this damage has occurred in the better stands of timber — trees that have escaped their natural enemies for 80 to 100 years or more and have a potential value, in terms of finished products, many times their stumpage price tags. Insects and diseases kill trees, contribute to their destruction, or they may simply retard their growth. Bug-killed trees are often replaced with those of inferior species, the presence of which requires costly shifts in management plans. A dead tree in the forest is a definite fire hazard. Owing to the remarkable progress that has been made in fire control and other phases of forest management during the last 25 years, forest pests are without a doubt the greatest single hazard to be overcome in the profitable production of future crops of timber.

In view of the complexity of the task and the varied interests involved a sound, practical, and effective forest pest control program for the United States must be developed on a foundation of common understanding of the objectives. And ways and means of attaining these objectives must be considered jointly by the several agencies of government and industry having responsibility in management, utilization, and preservation of our timber resources.

At first glance there are many complications. No less than four federal agencies have forest management responsibilities. State interests equal or exceed those of the federal government in many states. Timber under private ownership and management amounts to approximately four times that under public control. Both public and private lands are managed or controlled for a wide variety of purposes. The extent of interest in, and the attitude toward, pest control has been found to vary greatly even among public agencies and individuals having more or less common objectives. The facilities available to states and local agencies for cooperating in forest pest control vary widely in different parts of the country. The ability of individual owners to participate in area-wide control effort, the problem of absentee ownership, and the values involved—all must be considered. These are representative but not all the problems requiring some consideration in the development of a fully cooperative program.

There are a few fundamentals that should be recognized and observed in an undertaking of this kind. To suppress or eradicate pests we must first know where they are, what conditions favor their development, and when and how to apply suppressive measures for best results. This requires a background of research and periodic and systematic surveys of timber resources without regard to location or ownership. The frequency and intensity of the surveys may and should vary in different areas in accordance with the value involved and with the presence or absence of the important factors contributing to outbreaks. Surveys should be designed to detect in the early stages of development any insect or disease outbreak that occurs in the forests. With some 460 million acres of commercial timber subject to attack, this would appear to be an extremely costly, if not impossible, task. It is a big job. But it is possible, practicable, and not too costly provided we make the best use of tools now available, and have the full cooperation of men who make their living in the woods.

The Forest Pest Control Act of 1947 provides the necessary authority for the federal government to participate in all phases of forest pest control. It specifically provides for the surveys essential to the intelligent application of control measures when such are indicated. We hope that, as the program becomes fully operative, every man who is now engaged in any phase of forestry and whose duties take him into the woods will become to some degree a survey man. There are no better observers than good foresters. We should like to see greater uniformity in their reports and a more complete and carefully cataloged record of their observations. A few men with long training and experience in forest entomology and forest pathology—and I mean such men as Paul Keen, Jim Evenden, Bob Furniss, Noel Wygant, Leslie Orr, and others who will support them in this effort—have developed a survey plan which is fundamentally simple, utilizes to the fullest possible extent the supporting services of men having other responsibilities in the woods, avoids unnecessary duplication of effort, and provides for prompt assembling and releasing of data secured from all sources.

Our ultimate objective is to see that the survey completely covers

[1] Talk given at meeting of Western Forestry and Conservation Association, Portland, Oreg., Dec. 8-10, 1949.

the forested area of the United States in the most economical way possible consistent with biological soundness. We want to avoid duplication of effort, and we want to simplify procedures to the point that individual participation will not prove burdensome. We want to assemble and catalog survey information promptly preparatory to making it available as a basis for whatever further action may be indicated.

To expand and intensify the survey, we propose to provide additional technical personnel at field stations in the West and to extend similar services to other parts of the country. Obviously there is an important educational phase to this program. We plan to devise ways and means of bringing fundamental information to the attention of the many foresters and other technicians who spend much of their time in the woods. We shall apprise them of the pests they may encounter; where and under what ecological conditions they may be expected to find them; and how to make a quick appraisal of the extent, severity, and potentialities of such infestations as come to their attention. In short, we want to keep current on developments as a basis for applying suppressive measures promptly when such action is indicated.

Once a year and well in advance of the time when control work must be done, the results of the survey will be assembled. Threatening situations or any inconsistencies that appear in the reports will be carefully checked, and with the aid of responsible officials of the land-managing agencies, an appraisal of the information will be undertaken. You know better than I that 12 beetle-infested trees in one area may have far greater significance than a similar number under other environment. One situation may be economically important and the other of little significance either economically or biologically.

Men engaged in forest entomology, pathology, and management have learned that they must consider many factors in appraising the potentialities of an incipient outbreak of any insect or disease. Among the more important factors are (1) the history of outbreaks in the area, (2) management plans for the immediate future, (3) the location of the infestation with respect to valuable stands of timber that are exposed, (4) the cost of control in relation to the value of the timber that may be damaged or destroyed, and (5) the availability of suitable control measures.

The normal situation is for a biological balance to exist between insects and their natural enemies—environment, parasites, and predators. It is when this balance is disturbed by man or by nature—that is, when ecological conditions become particularly favorable for the pest, or for one cause or another the development of parasites fails to keep pace with the pest—that trouble is encountered. An intelligent appraisal of a small outbreak must therefore include consideration of just what is likely to happen if nothing in the way of artificial control is done. In some instances immediate action may be essential to forestall further damage and to prevent a much greater control expenditure at some later date. Perhaps the infestation should be kept under close observation for a season or two pending management practices that may change the ecology of the area to a less favorable environment, and the necessity for any other type of control thus avoided.

There are three things fundamental to a successful control program. We must know where the insect or disease occurs, what to do about it, and how and when to do it. The survey should tell us where threatening situations exist. What to do about them, calls for research. Highly effective control procedures are available for certain forest pests, principally defoliators. Marked progress has been made in the development of control procedures for others, and in the case of a few we are still very much in the dark. An aggressive and continuing program of research is essential if we are to find a solution to the unsolved problems, and to provide for improvements in those methods that are now reasonably satisfactory. Research is not static. What seems practically impossible today may be a simple task a few years from now.

A formula for cooperative effort in control which would be applicable in all cases, once it has been determined that some control is essential, would necessarily be so general as to be hardly worth discussing. It is quite evident that the cooperative approach to individual problems must vary with the location, the values at stake, the agencies concerned, and the facilities each is in a position to contribute. I am going to undertake, therefore, to separate the trees from the forest—to restrict my comments to a discussion of a few specific examples.

During the last few years several large-scale pest-control programs have been undertaken in which federal, state, and private agencies were interested. In each instance the work has been jointly financed, but in no two programs has exactly the same formula been used. I should like to discuss briefly, from the standpoint of cooperative effort, the tussock moth control program in Idaho in 1947, the spruce budworm control effort in Oregon in 1949, the grasshopper control program involving about 3 million acres of range lands in the semi-arid areas of Montana and Wyoming, and the gypsy moth control program in New England, New York, and Pennsylvania.

The first step in planning for the tussock moth control program was legislation passed early in 1947 by the State of Idaho permitting state funds totalling $210,000 to be administered by the federal government and authorizing the state forester to declare a "zone of infestation" for the purpose of suppressing forest insect pests. A federal appropriation of $390,000 to permit participation in this program was passed by the 80th Congress. The large timberland owners of the area agreed to pay a proportionate share of the cost. The Bureau of Entomology and Plant Quarantine assumed responsibility for the technical phases of the pro-

gram, and the U. S. Forest Service, in cooperation with the State of Idaho, assumed direction of field operations. The program was organized with a clear understanding of the responsibility to be assumed by each participating agency and the facilities that each would contribute.

Following similar advance planning, responsibility for spruce budworm control work in Oregon in 1949 was divided in accordance with facilities that each responsible agency was in a position to contribute. The State of Oregon, under the direction of the state forester, cooperated in the survey and other technical phases of the program in addition to assuming administrative responsibility for work that was done on state lands and the adjacent or intermingled private lands within the infested area. In a similar manner the Forest Service, through its regional office in Portland, made use of facilities close at hand in the management of the work that was done on federal lands and adjacent or intermingled private lands. An effort was made to arrive at an equitable distribution of the cost of these programs, keeping in mind ownerships involved and the overall objectives of the work.

In the grasshopper control project, which involved federal, state, and private lands, the basis of cooperation was spelled out in considerable detail in the state legislation providing funds for state participation in the work. Here again there was joint planning in an effort to arrive at an equitable distribution of the costs. In Wyoming the state appropriation was made contingent upon matching by the counties and the individual land owners who were to derive some direct benefit. As in the case of forest insects, one of the main objectives was to suppress outbreaks that if left uncontrolled might disperse over much greater areas.

In the gypsy moth control program the situation is quite different. Since this serious defoliator of forest, shade, and fruit trees became established in New England more than fifty years ago, a continuous effort has been made to prevent or retard its spread to the west and south. Until recently activity was centered largely along the western border of the generally infested area, and in outlying infestations in eastern New York and in Pennsylvania. The work has been financed jointly on about a fifty-fifty basis by the federal government and the states concerned. Federal interest has been primarily prevention of spread to other parts of the country. State interest, in New York and Pennsylvania, has been largely to restrict infestation to the small areas already invaded. Until recently, there was little opportunity or incentive for private participation. But with the new facilities now at hand it appears possible to eradicate the gypsy moth with a single treatment of DDT applied from aircraft at a cost of less than $1 per acre. As a result local communities within the generally infested area are now organizing, and with a minimum of federal aid have undertaken control and in some instances eradication on a county-wide basis.

In 1949 all of Cape Cod, with the exception of about 8,000 acres, was treated at an over-all cost of approximately $240,000. The work was financed jointly by the State of Massachusetts and Barnstable County, with federal contributions limited to technical direction and demonstration at a cost of about $12,000. It should be pointed out, however, that in this case recreational benefits and real estate investments for recreational purposes were the important considerations.

Federal participation in gypsy moth control will continue to be directed toward prevention of further spread while gradually reducing the size of the generally infested area. Encouraging progress has been made. In the Wilkes-Barre-Scranton area of Pennsylvania, for example, nearly 500 square miles of infested timber land has now been treated and extensive trapping and scouting for the last two years has failed to detect a single living moth. At the present rate of progress all known infestations west of the Hudson River should be eliminated by 1952. Naturally there are many small holdings and many people who have little or no personal interest in the matter. The very nature of the undertaking and the over-all objectives are such that financing with other than public funds—federal, state, county, and town—is practically impossible.

To summarize briefly, we believe that a thorough and intelligent survey must be made without regard to ownership, that the information obtained must be promptly checked and assembled for appraisal, and that prompt action should be taken to suppress infestations of threatening potentialities in an effort to prevent widespread outbreaks which in the past have proved so destructive and so costly to control. To do the job right we must fully utilize available funds, manpower, and equipment, and direct our efforts where they will prove most effective. If we follow this simple formula, the details with regard to division of responsibility, the equitable distribution of costs, and other variables sure to be encountered will not prove insurmountable. The Bureau of Entomology and Plant Quarantine recognizes a responsibility to see that well-organized and adequate surveys are conducted at minimum cost, that all agencies or groups of individuals concerned participate in appraising the information so secured, and that control work is carried out in the most economical manner possible, which means full utilization of the results of research.

The future of forest pest control is bright. It need no longer be looked upon as a grossly neglected phase of our forest programs. The Forest Pest Control Act provides broad, flexible authority for the federal government to participate in forest pest control. Some states have paralleling legislation; others are keenly aware of the need of it. Our experience has been that industry is prepared, and often anxious to carry its fair share of the load. It is now up to us to see that the job is done in a business-like manner.

Quality of Reproduction Following Partial Cutting of Northern Hardwoods

W. M. Zillgitt

Research forester, Lake States Forest Experiment Station, maintained by the U. S. Department of Agriculture, Forest Service, in cooperation with the University of Minnesota, at University Farm, St. Paul, Minn.

In this test, reproduction following partial cutting of northern hardwoods compares favorably in quality with that following clear cutting.

REGULAR ESTABLISHMENT of good quality reproduction is essential to the success of the selection system of forest management. Regardless of method of cutting, reproduction (largely sugar maple) is almost always adequate in number and distribution in the northern-hardwood type of Michigan. But some foresters feel that reproduction following partial cutting is inferior in quality to that resulting from clearcutting.

Proponents of the selection system maintain that even single-tree selection cuttings create small openings in which reproduction develops just as good form and height in fairly dense, even-aged patches as on clear-cut areas. It is claimed, furthermore, that the reproduction under partially cut stands contains a smaller proportion of stump sprouts.

The Upper Peninsula Experimental Forest at Dukes, Michigan offered a fine opportunity to test quality of reproduction because there were available experimental units ranging from clearcutting through heavy, moderate, and light selection cutting to an uncut reserve area, all established from 1927 to 1929. Reproduction on these cuttings ranges up to twenty feet or more in height. It is large enough to give a good indication of form and other characteristics of quality. Accordingly, in 1948, all living reproduction of merchantable species 0.6 inch d.b.h. and larger was tallied on randomized strips (0.5 acre of tally per plot) on permanent sample plots in six different cuttings and a reserve unit.

The cuttings included a 100-percent clearcutting, a 12-inch diameter limit cutting in which 90 percent of gross volume was removed, a 62-percent overmature and defective cutting, a 46-percent heavy improvement cutting, a 24-percent light improvement cutting, and a special group selection cutting.

Each tree tallied was classified on the basis of origin, relative position in its particular age class, form, condition, and clear length.

The proportion of good quality trees in the samples taken (Table 1) offers some interesting comparisons:

Origin.—The proportion of trees with good origin (seedling or seedling sprout as against the inferior stump sprout) increases regularly from clear cutting through the series of partial cuttings to the reserve plot, with a drop again on the group selection area (a special cutting removing 45 percent of the gross volume in variable-sized openings). This seems reasonable since on the heavier cuttings, more stumps in full light are available for sprout development.

Position.—The proportion of trees with good position (dominant, codominant, or intermediate as against suppressed) is about the same for the three heaviest cuttings and the group selection. For the lighter cuttings and the reserve, it increases somewhat, probably because the fewer trees in the reproduction class have more room and are less in danger of being suppressed. On the clearcutting, the canopy is so tight that many small trees are dying.

Form.—The proportion of trees with good form (straight to moderately crooked as against seriously crooked or forked) varies only moderately from cutting to cutting. There is little basis for singling out any cutting as superior or deficient in this respect.

Condition.—The proportion of trees in good condition (vigorous and with no rot as against weak or diseased) also varies little from cutting to cutting. The reserve ranks lowest in this attribute, as it does also in the case of good form.

Clear Length.—The proportion of trees with good clear length (free of branches for at least half of total height) remains fairly constant through the heavy and moderate cuttings. It lowers a little in the lightest cutting and the reserve. There are actually fewer trees in the light cutting and reserve, hence fewer trainers. It is also down in the group selection cutting where there is apparently more side light as a result of the openings. There is also a larger proportion of yellow birch in the tallies from the latter unit than from the others in the test, which may account for more limbiness.

The proportion of good trees in the tallies considering all the above

TABLE 1.—PROPORTION OF TREES POSSESSING VARIOUS GOOD ATTRIBUTES ON 0.5 ACRE OF TALLY FROM EACH CUTTING

Degree of cutting	Attribute					
	Good origin[1]	Good position[2]	Good form[3]	Good condition[4]	Good clear length[5]	Total trees
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Number*
100 percent (clearcutting)	60	58	81	89	64	779
90 percent	72	55	85	90	69	613
62 percent	76	59	83	97	63	492
46 percent	86	73	83	94	62	387
24 percent	90	89	85	89	55	253
No cutting (reserve)	96	82	75	85	55	320
Special cutting (groupwise)	87	64	77	94	53	565

[1]Seedling or seedling sprout. [2]Dominant, codominant, or intermediate. [3]Straight to moderately crooked. [4]Vigorous; no rot. [5]Free of branches for at least half of length.

attributes except clear length[1] (Table 2) can be summarized as follows: The proportion increases regularly from clearcutting through light improvement cutting. There is a slight decrease in the reserve, and a still further decrease in the group selection cutting. The last named cutting is, of course, a series of clear-cut openings so some decrease seems reasonable.

Another and perhaps more sound way to compare quality of reproduction on the cuttings observed in this study is on the basis of the number of good trees per acre (Table 2). There is virtually no difference between the clearcutting, the 90-percent cutting, the 62-percent cutting, and the 46-percent cutting in this respect. The number falls off for the 24-percent cutting and the reserve; it rises sharply for the group selection cutting.

To appraise these cuttings on the number of good small trees present alone, without regard to the poor trees also present, hardly seems sound. Certainly, the good trees on the partial cuttings with fewer poor trees with which to compete, stand a better chance of survival than do those on the clearcutting. It would seem, moreover, that even the poorest cutting in the series tested (the 24-percent cutting with 310 good trees per acre) has sufficient reproduction for a satisfactory future stand.

For the cuttings examined in this study, at least, the quality of reproduction following partial cutting suffers nothing by comparison with that following clearcutting. In number of good trees, moderate selection cuttings appear just as good. In proportion of good trees, all degrees of partial cutting are superior to the clearcutting.

TABLE 2.—NUMBER AND PROPORTION OF GOOD TREES PER ACRE[2]

Degree of cutting	Good trees[3] Number	Good trees[3] Percent of total
100 percent (clearcutting)	414	27
90 percent	420	34
62 percent	394	40
46 percent	414	53
24 percent	310	61
No cutting (reserve)	340	53
Special cutting (groupwise)	522	46

[1]Clear length has been eliminated from consideration at this point in the discussion because it hardly seems conclusive enough at the stage of development of these trees to be a determining factor for good or bad.

[2]Based on 0.5 acre of tally from each cutting.

[3]Seedling or seedling sprout; dominant, codominant, or intermediate; straight to moderately crooked; and vigorous—no rot.

Treated Timber in the Coal Mining Industry—Its Application and Economic Justification

James E. Huffman
Mt. Hope, West Virginia.

THE PERPETUAL PROBLEM of roof support in coal mining has always been one of the industry's greatest headaches. Today, more than ever before, mining men are searching for a solution to the perplexing presence in mines of fungi in abnormal proportions, which leads to rapid decay and subsequent failure of costly wood constructions that are erected to hold up the dangerous roof rock.

From the standpoint of economies and suitability for mining, the geological conditions under which coal was formed resulted in essentially four types of coal seams. These are in order of their desirability: (1) Seams of good quality coal with good mining conditions; (2) seams of good quality coal with poor mining conditions; (3) seams of poor quality coal with good mining conditions; and (4) seams of poor quality coal with poor mining conditions. As has been the case with our American timber, coal has also been mined on a "first come, first served—the easier, the better" basis. Early mines operated mainly in the first category where the coal was good, the seams thick, and where a solid "top" created no great support problem. Today, since most of the mines in the "easy" seams are exhausted, the coal industry has been forced to select from seams of the number two or number three variety. The greatest number of our present day mines are producing good quality coal under poor mining conditions, and therefore are encountering a more difficult roof than was the case in the past years.

Advantages and Disadvantages of Wood for Mine Use

Wooden timbers have been used for roof support since the birth of mining. Recently there has been some experimental work with roof support, which, if successful, may eliminate much of the conventional post timbering. The roof is supported through the insertion of steel rods up into the "top," thus tying the rock laminations together. This resists horizontal movement, preventing sag, and creates a beam effect. Wooden dowels or plugs have also been successfully used to serve the same purpose (Fig. 1). Among the many advantages of wooden timbers are: (1) great strength in relation to its weight; (2) ease with which it can be cut and framed; (3) relatively low cost; (4) the very important fact that wood will "talk" before failing—thus warning the workers of the danger that is present.

On the opposite side of the ledger, wood also has some disadvantages. The most outstanding and troublesome is the fact that wood is susceptible to attack by fungi. In the average mine, wood will give only one-tenth to one-half of the service life that it would under normal outdoor conditions. Another factor, although not quite as serious, is an increasing scarcity of good quality wood. This insufficiency is largely due to poor forestry practice in mining local-

ities, which has resulted in depleted and denuded forests. Present hauling distances are greater and consequently prices are higher. Timber deliveries are unstable because present inflated prices have caused much of the mine grade timber to go into the higher value markets. Finally, the current shortage of woods labor in the mining fields has had its effect.

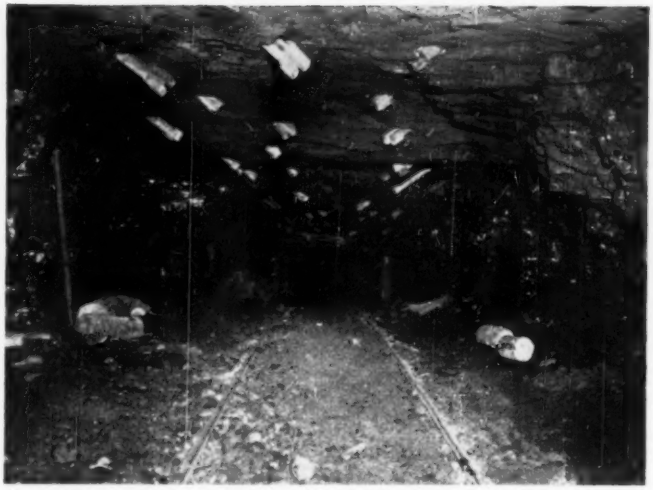


FIG. 1.—Wooden plugs or dowels may be used for roof support, as in this western Kentucky coal mine. Conventional timbering can be seen in the background.

Annual Consumption of Timber in the Mining Industry

Roof falls cause more than one-half of all fatal underground mine accidents. A tremendous amount of money is spent each year by the industry to combat these slate falls. The fact is that as much money is spent each year for timber as for all other materials combined.

The 1946 and 1947 annual production of the bituminous and anthracite mines was roughly 600 million tons of coal. In this production, wood is consumed at the average rate of 4 board feet per ton. Simple calculation then will tell us that the mining industry consumes 2,400 million board feet every year to support production. This timber, valued at a conservative $40 per thousand feet (southern West Virginia average price) would amount to a yearly expenditure of $96 million. A good 80 percent of this cost is used directly in the support of mine roof.

"Permanent" and "Temporary" Mine Timbers

Timbers installed in the mine are classified as either "permanent" or "temporary." The category into which a piece of timber goes depends upon the location in which it is placed and the use to which it is put. Timbers that are placed in airways, main haulways, and shafts fall into the "permanent" group, because the sections in which they are placed will be active for a long period of time. "Permanent" timbers (Fig. 2) if untreated, will always have to be replaced at least once, and in most instances will have to be replaced at intervals of from 6 months to 4 years for the entire life of the mine. In other words, a simple definition of "permanent" timbers would be any untreated timber which will not outlive the job it is designed to do.

On the other hand, "temporary" timbers (Fig. 3) are exactly the opposite. They almost never have to be replaced and are used mostly for roof support in mining rooms or breasts where service is not to be expected for a long period. Usually, 2 or 3 months is the maximum time that a "temporary" timber will be in active service.

Of the total volume of wooden timbers used in mining, about 15 percent is classified as "permanent." "Permanent" timbers are usually quite a bit larger in size, and are manufactured from higher grade material than are temporary timbers. Therefore, the value per unit of "permanent" timber is

FIG. 2.—Erecting "permanent" timbers in the Pennsylvania anthracite region. Note the size of the timbers. These timbers will have to be replaced in from 3 to 5 years. The timbermen receive wages in excess of $14 per day.

considerably higher than that of the "temporary" type. Because of the normally larger size of the permanent type, a substantially higher labor cost is encountered in erection and replacement. The labor cost encountered in the installation of "permanent" material will be just about triple the cost of the timber. Labor cost applied to "temporary" timber will be about twice the cost of the material. Therefore, in actual total outlay of timber dollars, the cost for timbering along permanent headings will not be a 15 percent problem, but closer to 40 percent problem.

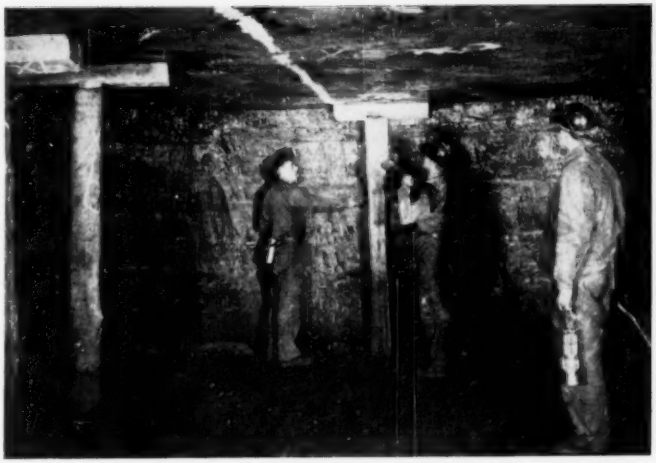


FIG. 3.—Erecting "temporary" timber in a large bituminous mine in West Virginia.

Decay Conditions in the Coal Mine

Conditions for the development of fungi in most coal mines are ideal. The temperature remains relatively constant throughout the year, ranging between 50 and 65 degrees F. Food supply is excellent, moisture conditions are good, and there is enough air circulation to make the transportation of the spores favorable. The difference in the humidity conditions of summer and winter results in a seasonal variation of the condensation inside the mine, creating an alternate wet and dry situation that plays a most important role in the acceleration of the underground decay.

Under these circumstances wood will often last only 6 months before decay failure; hardly ever will it last longer than 4 years. Many of the fatal accidents which occur in mining coal are direct results of the failures and attending roof falls. Roof support difficulties, therefore, are not actually in how to hold the "top," but in how to control the swift and deadly deterioration of the "permanent" timbers used in the support.

Extended life of "permanent" timbers has been attained in the past through the practice of using larger material, which would withstand the attacks of fungi for a longer period of time and thereby postpone failure and replacement. Another such measure was to use more durable species such as black locust. However, these expedients possessed certain features which did not fit ideally into the mining operation. The larger timbers were more costly and called for an immense labor expenditure in erection. In addition, they utilized too much of the precious space, which in turn limited freedom of movement and slowed production. The end of the use of black locust is in sight because the usable supply of this species had dwindled to the point where transportation and concentration charges make its use uneconomical. Black locust can still be found in quantity in mining localities, but damage incurred by the locust borer had reduced its strength so much that it is not satisfactory for carrying great weight loads. Modern fast-growing locust has much sapwood and is far inferior to the slow-growth heartwood-rich locust used many years ago.

The Value Of Treated Timber

The logical end to this search for decay resistant material has brought many of the more progressive mine operators to the use of preserved timber for support in the critical mine sections where the operation must remain open for continuous, efficient production.

The recent trend toward the use of treated timber has been long delayed because mining men in their constant fight to keep costs low considered treated timber too expensive. This feeling was quite justified too, for the interested people of the wood preserving industry were slow to point out that comparative costs should be made over the life span of the treated material. It is easily proved that with the elimination of high cost replacements, the savings that result are enormous. Today the use of treated timber has progressed to the place that it is not uncommon to hear a mine owner remark, "Any timber which will have to be replaced even once should be treated."

Advantages of treated timber are many. A few of the most outstanding are the added safety which result from a well-supported roof, the elimination of oversized timbers, allowing more working space, and the release of maintenance men for more productive jobs. Treated timber permits the use of common wood species not usually acceptable for mine work. It can be stocked inside the mine without deterioration. Probably the most important of all advantages is that a sustained program of using treated timber will permit huge dollar savings.

Kinds Of Preservative and Types Of Treatment

Various preservatives and methods of application are used by the coal industry. The most commonly used preservatives are creosote, chromated zinc chloride, Wolman salts, and Osmosalts (Fig. 4). The latter two are proprietary sodium fluoride preservatives. Penetrating application of these preservatives is generally made by three methods. Creosote, Wolman salts, and CZC are either applied by mechanical pressure or by the "hot and cold bath" methods. The Osmosalts treatment is applied through the use of natural (osmotic) pressure to fresh cut green wood. The entire Osmose process consists of an instantaneous immersion in the preservative suspension, dead piling, and covering for a period of twenty to thirty days. Creosote, Wolman salts, and CZC treated timber is generally purchased from commercial treating plants and delivered by rail in carload lots. On the other hand, Osmose treating is usually done by the mine owner at the site of his operation.

Economics Of Treated Timber

Monetary savings as a result or using treated timber can easily be determined. Following is a simple analysis. Let us assume that the average life desired for a "permanent" treated timber is twelve years; that the average life of an untreated timber is three years; that untreated timber can be purchased for forty dollars per thousand feet, and that the treated timber costs one hundred dollars per thousand feet.

12 YEAR COST, USING TREATED TIMBER	
Cost per M. ft. treated.....	$100.00
Labor cost per M ft. erected....	100.00
Cost for 12 years service.....	$200.00

12 YEAR COST, USING UNTREATED TIMBER	
Cost per M ft. untreated timber.	$ 40.00
Labor cost per M. ft. erected...	100.00
Cost for 3 years service.....	$140.00
Multiplied by units necessary...	x4
Cost for 12 years service.....	$560.00

Thus the difference in the 12-year cost between using untreated and treated timber is $560 minus $200, or $360 per thousand feet. This $360 divided by 12 years equals $30, which is the saving made for each thousand feet over the full desired life of the preserved timber.

Of the total annual consumption of 2,400,000,000 board feet in the industry, 15 percent or 360,000,000 board feet is classified as "permanent" and should be treated. Applying the annual $30 saving to the "permanent" 360,000,000 board feet, we have a total annual saving in the industry of $10,800,000. This represents quite a dividend to be paid for 12 successive years on a single year's treating investment of only $21,600,000. In fact, this amounts to a compounded interest rate of a fraction more than 16 percent for the 12-year period. Astounding, but very true. The sad part of this whole story is that less than 10 percent of this potential saving is actually being realized.

Summary

1. The coal mining industry has always been confronted with the problem of supporting the mine roof.

2. With its many advantages, timber is the conventional material used to secure this support.

3. The roof support problem is becoming more severe with inflated wage scales and the increasing decay rate due to the use of second growth timbers with much sapwood.

4. All timber erected which is of permanent nature should be treated.

5. Treated timber allows for safe and more stable mining conditions.

6. The use of treated timber results in huge money savings.

7. Of the 2,400,000,000 board feet of timber used each year in the production of coal, 15 percent is classified as "permanent" and should be treated. Only about 10 percent of the full potential of 360,000,000 board feet of such timber is actually treated.

FIG. 4. Osmose treated timber in a large West Virginia bituminous coal mine.

Materials for Protection Against Biting Insects[1]

B. V. Travis[2] and Carroll N. Smith

Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture.

A NUMBER OF RESEARCH agencies have been searching diligently during the past decade for new materials that an individual can use to prevent bites of insects, mites, and ticks. At the Orlando, Fla., laboratory of the Bureau of Entomology and Plant Quarantine, which was supported during the past war by the Office of Scientific Research and Development and subsequently by the National Military Establishment, more than 10,000 chemicals have been tested as insect repellents and toxicants. The Carbide and Carbon Chemicals Corporation, through its research project at Rutgers University, New Brunswick, N. J., the Naval Medical Research Institute at Bethesda, Md., and the Army Chemical Corps at Edgewood Arsenal, Md., as well as several laboratories in other countries, have contributed materially to the knowledge of insect repellents and more effective ways of using them.

The discoveries and developments by these laboratories have made it possible for an individual to protect himself adequately in the field against the bites of mosquitoes, stable flies, sand flies and punkies (no-see-ums), black flies, chiggers (red bugs), and ticks. Such protection is of especial importance to sportsmen, foresters, and other field workers in localities where control measures are impractical. In addition, repellents have made it possible to keep open many recreational areas that were formerly closed during the season of insect activity.

It is necessary, therefore, to select carefully the materials to be used and to use them properly. Many of them are effective only against certain pests. Some of the effective repellents are not available commercially and others have proved toxic to humans or irritating to their skin. Only materials that are known to be available and safe for use are discussed here.

Protection Against Mosquitoes and Biting Flies

Most bites of flying insects, such as mosquitoes and biting flies, occur on skin areas not covered with clothing. Exposed skin should receive a liberal and uniform application of one of the recommended repellents. Insects will find and puncture any small area where the repellent has not been thoroughly applied. A fairly thick film of repellent is therefore necessary for maximum effectiveness against most species. Shake or pour a few drops into the palm of one hand, rub the palms together to smear evenly, and then rub the hands, wrists, neck, ears, face, or any other exposed skin, much as in washing.

The repellent may cause a slight burning of mucuous membranes and eyes, and should be used sparingly on or around such areas. The treated skin may feel warm for a few minutes after application, especially if it is moist or sweaty.

A number of factors influence the duration of effectiveness of repellents. A given material will last much longer on some people than on others. Perspiration or rubbing against the clothing, vegetation, or other things tends to shorten the effective time. Different insect species vary widely in their reaction to repellents, as illustrated in Table 1. With conditions so variable, a treatment may last from a few minutes to several hours, and repellent should be re-applied as frequently as the insects resume biting.

The following insect repellents are commercially available, and from toxicological tests on laboratory animals are considered safe for use on the skin: Dimethyl phthalate, dimethyl carbate, Indalone, 6-12, and 2-phenoxyethyl acetate. Some of these repellents are on the market under various trade names and frequently are diluted with alcohol or prepared as creams. With the exception of the creams, the repellents give best protection if used undiluted.

If the insects are biting through the clothing, a repellent in solution or emulsion may be applied to the cloth, *provided the cloth is wool or cotton and contains no synthetic fibers.* Most repellents will dissolve paints, varnishes, many of the plasties, and some synthetic fabrics; therefore, care should be taken not to spill them on such surfaces. They may be rubbed on the clothing by hand or applied with a small hand sprayer. About 2½ ounces are needed to treat a shirt, trousers, and pair of socks. Water emulsions of the repellents may also be used to impregnate the clothing. This treatment provides a uniform deposition of repellent and is especially convenient where a large amount of clothing is to be treated at the same time. Garments that are thoroughly treated

TABLE 1.—AVERAGE PROTECTION TIME (IN MINUTES) OF FOUR STANDARD REPELLENTS AGAINST MOSQUITOES AND FLIES, WHEN THE REPELLENT IS APPLIED TO THE SKIN.

Species	6-12	Dimethyl Phthalate	Indalone	Mixture[1] 6-2-2
		Laboratory Tests		
Mosquitoes:				
Aedes aegypti (L.)	331	247	141	271
Anopheles quadrimaculatus Say	53	108	41	147
Anopheles freeborni Aitken	466	477	274	416
Anopheles punctipennis (Say)	477	477	282	455
Anopheles farauti Laveran	288+	43	72	198
Stable fly, *Stomoxys calcitrans* (L.)	101	47	246+	189
		Field Tests		
Mosquitoes:				
Aedes taeniorhynchus Wied.	272	160	145+	243
Mansonia spp.	406	243	—	336
Stable fly, *Stomoxys calcitrans* (L.)	46	38	192+	—

[1] Six parts of dimethyl phthalate and 2 parts each of 6-12 and Indalone.

[1] This work was conducted under funds allotted by the National Military Establishment to the Bureau of Entomology and Plant Quarantine.

[2] Now with Cornell University.

will remain effective for 2 or 3 days of ordinary wear, provided they are not washed or otherwise wetted. Any of the materials named for use on the skin can be used on clothing. In addition, 2-butyl-2-ethyl-1,3-propanediol and hexyl mandelate are very effective for clothing applications.

Protection Against Chiggers

Materials giving protection against chiggers (*Eutrombicula alfreddugesi* Oud.) are most effective and durable when applied to clothing, although some benefit will result from applications to the skin. The action of chemicals on chiggers is largely toxic rather than repellent.

The materials may be applied to the clothing by rubbing, spraying, or impregnating with emulsions in the same manner as described for clothing treatments for protection against mosquitoes and other flying insects. If the treatment is made by hand or by sprayer, liberal applications should be made around all openings of the clothing, both inside and outside, and on the socks above the shoes and inside below the shoe tongue. With emulsions the entire outer clothing and socks should be impregnated.

The same materials recommended for use against mosquitoes are effective against chiggers, but benzyl benzoate is preferable, as it is more resistant to water. This material will remain effective after several washings or rinsings, but the other liquid materials should be re-applied to clothing after each washing or soaking in water. Benzyl, which is a solid, is also highly effective against chiggers and is more resistant to wetting than benzyl benzoate. For impregnating a heavy cotton outfit, $2\frac{1}{2}$ ounces of benzyl may be dissolved in $1\frac{1}{2}$ quarts of dry-cleaning fluid. The garments should be wetted with this solution and then allowed to dry before they are worn. Emulsion concentrates containing 20 parts (by weight) of this material, 70 parts of xylene, and 10 parts of Triton X-100 or other emulsifying agent are diluted at the rate of 1 part to 3 parts of water, and enough of the emulsion is used to make the clothing thoroughly wet.

If a mosquito repellent or benzyl benzoate is used, the same precautions against damage to synthetic cloth or plastics must be followed, but benzyl will damage synthetic materials.

Protection Against Ticks

None of the materials considered safe for use on man provide complete protection from ticks, but several of them afford a high degree of protection against the lone star tick (*Amblyomma americanum* L.). The socks and all the outer clothing should be treated with a solution or emulsion of a repellent. The materials that appear to be most effective against ticks are, in order of preference: N-butylacetanilide; hexyl mandelate; Indalone; dimethyl carbate; 2-butyl-2-ethyl-1,3-propanediol; diethyl phthalate; and benzyl benzoate. Treated clothing remains effective through several days of ordinary wear, but not after laundering.

These repellents may be applied to clothing as solutions in dry-cleaning fluids, or as emulsions, at the rate of $2\frac{1}{2}$ ounces for an entire outfit in enough liquid to wet the garment thoroughly. This amount is at the rate of about 2 grams per square foot of cloth. The emulsions are prepared by mixing 1 part of liquid soap, Tween 80, Triton X-100, or other emulsifying agent with 9 parts of repellent before it is added to the water. 2-butyl-2-ethyl-1,3-propanediol is a solid at normal temperatures, and should be dissolved in an equal quantity of xylene before the emulsifier is added.

N-butylacetanilide should be used with caution. Toxicological tests on rabbits indicate that it is too toxic for application directly to the skin. However, it is considered safe for use on clothing at a rate not more than 2 grams per square foot, and treated uniforms have now been tested on a large number of persons without adverse effects other than a mild burning of the skin on an occasional susceptible individual.

Information about finished repellents and mixtures can usually be obtained from the following companies. This list is not complete, and no discrimination is intended or implied for names omitted, nor is warranty given as to the grade or standard of the product.

Carbide and Carbon Chemicals Corp.
Fine Chemicals Division
30 East 42nd Street
New York City, New York

The J. B. Williams Company
420 Lexington Avenue
New York City, New York

U. S. Industrial Chemicals, Inc.
60 East 42nd Street
New York City, New York

Brief Bibliography on Repellents

Cross, H. F. and R. L. Fye, 1948. Use of powders on clothing for protection against chiggers. Jour. Econ. Ent. 41(5): 731-734.

Cross, H. F. and F. M. Snyder 1949. Chigger control—washing and aging tests of a selected group of compounds effective as clothing treatments against chiggers. Soap and Sanit. Chem. 25(2): 135, 137, 139, 141, 143.

Granett, P. 1943. The significance of the development of mosquito repellents for the protection of military and civilian populations. N. J. Mosquito Extermin. Assoc. Proc. 30: 293.

Knipling, E. F. 1946. Recent developments in the use of DDT and other mosquito insecticides and repellents. Jour. Natl. Malaria Soc. 5(2): 118-121.

Knipling, E. F. 1948. New insecticides, acaricides, and repellents for the control of arthropods attacking man. 4th Intern. Cong. Trop. Med. and Malaria Proc., U. S. Dept. State Pub. 3246 II: 1702-1712.

Knipling, E. F. 1949. Mosquito repellents. Chapt. 52 in Malariology, Vol. II, edited by Mark F. Boyd. Saunders.

Lindquist, A. W., A. H. Madden, and C. N. Watts 1944. The use of repellents against fleas. Jour. Econ. Ent. 37(4): 485-486.

Smith, C. N. and D. Burnett, Jr. 1949. Effectiveness of repellents applied to clothing for protection against salt-marsh mosquitoes. Jour. Econ. Ent. 42(3): 439-444.

Snyder, F. M. and F. A. Martin, 1946. Chigger repellents—Benzyl benzoate, dimethyl phthalate, and dibutyl phthalate for impregnation of clothing to prevent chiggers (mite) attachments. Soap and Sanit. Chem. 22(11): 133,135.

Travis, B. V. 1947. New insect repellents. U. S. Dept. Agr. Yearbook 1943-1947: 628-631.

Travis, B. V. 1947. Mosquito repellents. Amer. Perfumer and Essential Oil Review 50(2): 141-142.

Travis, B. V. and F. A. Morton 1946. Treatment of clothing for protection against mosquitoes. N. J. Mosquito Extermin. Assoc. Proc. 33, 65, 69.

Travis, B. V., F. A. Morton, and C. N. Smith 1949. Use of insect repellents and toxicants. U. S. Bur. Ent. and Plant Quar. E-698 (revised), 7 pp. [Processed.]

The Mechanical Effect of Fusiform Rust Cankers on Stems of Loblolly Pine

Karl F. Wenger

Silviculturist, Central Coastal Plain Branch, Southeastern Forest Experiment Station, Charleston, S. C.

THE DAMAGE CAUSED by the fusiform rust fungus (*Cronartium fusiforme* (Pk.) Hedge. & Hunt) in southern pine nurseries, plantations, and young natural stands has been described and its importance is well recognized (5). The effect of the disease in older stands has not received so much attention, probably because the damage is not so noticeable. The disease attacks through the needles and grows into the inner bark, frequently reaching and girdling the main stem. Seedlings and small saplings are almost always killed. In larger trees the stem often is not girdled, and the uninfected cambium at the edges of the lesion produces callus growth. Wood-rotting fungi become established in the dead wood. The infection continues to spread, but new callus is produced by the growing stem. A characteristic canker is formed with a sunken area of rotten wood surrounded by the callus swelling.

Mainly because of the suspected danger of high loss from wind-break, the question of the urgency of removing cankered trees arises whenever intermediate cuttings are made. If a large proportion of cankered trees is cut, irregular and excessively large openings often result, financial returns are reduced through lowering the volume and quality of the final products, and the silvicultural system may be badly upset. What was planned as a moderate thinning may, in extreme cases, come to resemble a shelterwood cut instead. Furthermore, the cankered trees themselves often are otherwise excellent crop trees. The cankers appear as often on dominant and codominant trees as on those of the lower crown classes, and the rot behind cankers is usually localized.

An inspection of actual stands seldom reveals more than a few wind-broken trees, indicating that the danger of wind-break may not be very great. The record of a loblolly pine stand near Charleston, S. C., supports this inference. A 40-acre tract on the Santee Experimental Forest[1] was partially cut in 1946. Twenty-one dominant cankered trees were deliberately left. The canker sizes ranged from 5 to 50 percent of stem circumference. Shortly after the stand was thinned, the edge of a tropical hurricane struck, with wind velocities approaching 40 miles per hour. None of the cankered trees was broken then, and at the present time all are still standing. The danger of wind-break thus seems to be less than is sometimes believed.

In order to take advantage of the evidence that some cankered trees may safely be left in commercial timber-cutting operations, we should know how to identify trees cankered to a dangerous degree. Such knowledge would permit retaining those trees until they actually become poor risks or until their removal is dictated by other considerations. Losses because of the disease would be considerably reduced thereby. Because the problem of cankered trees was urgent in loblolly stands on the Santee Experimental Forest, study of the relationship between canker characteristics of loblolly and the risk of wind-break was undertaken.

Procedure and Results

Since the cankers vary in size relative to the stem on which they are found, the fraction of full strength that the cankered stem retains can be expected to vary according to some dimension of the canker. A reasonable estimate could be made of what size canker it is safe to leave if the fraction of full stem strength required to withstand wind of the maximum expected velocity were also known.

Canker Size Related to Strength

A number of cankered trees were felled, and sufficient external and cross-sectional measurements were obtained so that the cross-breaking strength at the weakest point in the canker could be computed.[2] The normal strength of the stem (if the canker were not present) also had to be known so that the effect of the canker on that strength could be determined. The normal strength was calculated from the normal diameter approximated from the diameters above and below the canker. The effect of the canker on the stem strength was expressed by taking the strength of the cankered section as a percentage of the normal strength at the same point.

Estimating the risk of wind-break would be facilitated if a single expression of canker size were related to the percentage of normal strength. The greatest width of the canker, the ratio of its length to its width, its open area, and the percentage of stem circumference it affected seemed most likely to be related to the strength of the cankered stem. When the percentage of normal strength was plotted over each of these dimensions in turn, it was found that the percentage of stem circumference cankered was much more closely related to the percentage of normal strength than were any of the other factors. The regression is shown in Figure 1. Canker size, as used hereafter in this discussion, refers to the percentage of stem circumference cankered.[3]

Strength Required to Withstand Wind

Knowing the form, dimensions, and composition of a beam, one may calculate the load causing a certain deflection at the point of application (3). A tree approaches the form of a cantilever beam of uniform strength and circular section known as a cubical paraboloid (1). Consequently, by measur-

[1] Experimental forest of the Central Coastal Plain Branch of the Southeastern Forest Experiment Station.

[2] Details of the computational methods used in this and other steps are on file at the Southeastern Forest Experiment Station.

[3] The cankered portion includes, in addition to exposed wood, the live bark which shows evidence of infection by distorted growth and/or evidence of the yellow pustules of the blister stage.

ing the distance a given stem is bent from its position at rest and the wind velocity causing it to bend, one may calculate the force exerted against a crown of a given size by that wind velocity.

Eleven measurements of deflection and wind velocity were made with trees of 8 to 16 inches d.b.h. and wind velocities of 15 to 20 m.p.h. From these, the relationship of strength requirement (Y) and wind velocity (v) was determined to be: $Y=0.0363v^2$. Computed from these same data the wind force per unit area of crown surface is nearly that which would be exerted against a solid flat surface (*4*). The equation therefore only roughly approximates the true relationship because a lesser, rather than an equal, force would be exerted against a tree crown. A substantial margin of safety, consequently, is introduced since the estimate of safe canker size will be based on a greater load than will actually be applied by the maximum expected wind velocity.

Growth Rate of Cankers

In order to estimate the canker that is of safe size to leave, allowance must be made for its growth until the stand is again cut over. The adjustment must be expressed in terms of canker size in order to be applicable to the initial estimate of safe canker size.

The correlation of age and canker size, although significant, was not as close as another more suitable relationship: canker size and average annual canker growth in size. This relation is shown in Figure 2.

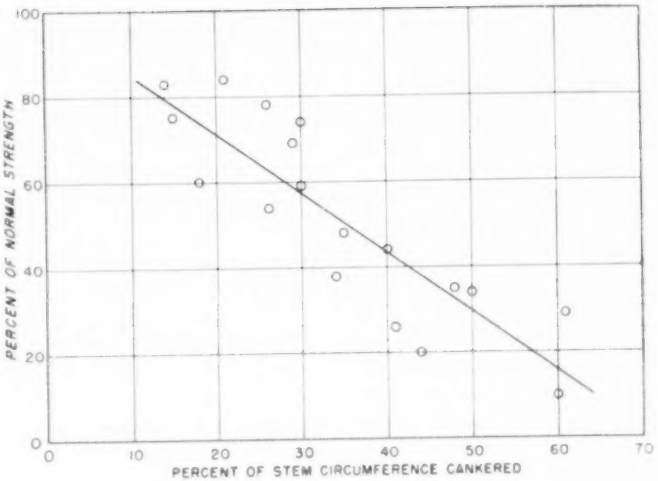


Fig. 1.—Relationship of canker size to stem strength.

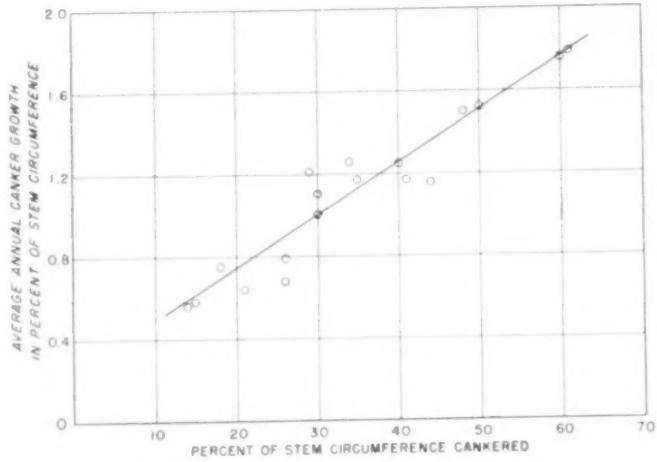


Fig. 2.—Relationship of canker growth to canker size.

Integration of Results

The relation of canker size to bole strength and wind velocity to strength requirement having been approximated, the estimate of safe canker size depends on the maximum wind velocity to which the cankered tree will be subjected and on the length of time until the next cutting.

Exclusive of tropical hurricanes which may endanger uncankered as well as cankered trees, velocities above 40 m.p.h seldom occur. The record at Charleston, S. C., is pertinent and representative. During the five years, 1938-1942, maximum velocities greater than 40 m.p.h. occurred on possibly six days. Two were in connection with hurricanes in 1938 and 1940 during which velocities of 43 and 66 m.p.h., respectively, were recorded. On the other days the wind velocity was 40 to 45 m.p.h. (*6*).

Fons (*2*) has shown that wind velocities are markedly reduced at crown level in continuous forest stands. From his data it is deduced that the expected maximum wind velocity of 40 m.p.h. would not be more than 25 m.p.h. at the crown level. This approximation also contains a reasonable safety factor.

Inserting the velocity of 25 m.p.h. in the above equation of strength requirement gives a value of 23 percent. According to the regression line in Figure 1, that strength requirement permits a canker size of 55 percent. Fifty-five percent, then, is the size beyond which the canker will endanger the

tree. The canker which is safe to leave is one that will not grow beyond 55 percent in the interval between cuttings. Figure 2 shows that a canker of this size has grown 1.64 percent per year. Consequently, a canker larger than 47 percent will grow beyond the critical size during a cutting interval of 5 years; one larger than 40 percent (computing canker growth by 5 year spans) will grow beyond the critical size in 10 years. For any other cutting interval the safe size can be determined in similar fashion.

Silvicultural Application

The recognition of safe canker size in timber marking is relatively simple. If the width of the canker just equals the stem diameter when viewed from a point directly in front of it, it affects somewhat less than one-half the stem circumference. Therefore, if any sound callus can be seen extending past the canker along both edges when the observer is facing that side of the tree, the canker covers less than one-half the circumference and the tree is safe to leave for 5 years.

The difference in the safe canker size for the 5-year- and 10-year-cutting intervals, 47 and 40 percent respectively, is so small that its recognition may seem uncertain. Experience shows that it is possible to distinguish between these two sizes, however. After proficiency in recognizing canker sizes is attained, a slightly more conservative estimate will provide the additional margin of safety required for the longer cutting interval. Cankers of different sizes are shown in Figure 3.

Leaving cankers as large as 40 to 50 percent often will result in an appreciable proportion of the residual stand consisting of cankered trees. While these can be retained for one or two cutting cycles, they should not be left until mature, because of the danger of heart rot developing with greater age.

In managed stands there should be ample opportunity to reduce cankered trees to a negligible number at a sufficiently early age to keep cull losses and breakage at a minimum. Their removal can simultaneously be controlled through the recognition of such factors as the risk of wind-break so that the stand is maintained at the maximum productivity permitted by the degree of infection.

A B

Fig. 3.—*A* shows a canker affecting 20 percent of stem circumference, and *B*, 60 percent.

Literature Cited

1. BUSGEN, M. and E. MUNCH. 1929. The structure and life of forest trees. John Wiley and Sons, New York.
2. FONS, WALLACE L. 1940. Influence of forest cover on wind velocity. Jour. Forestry 38:481-486.
3. GEORGE, S. G. and E. W. REITHER. 1935. Mechanics of materials. McGraw Hill Book Company, New York.
4. HUMPHREYS, W. J. 1940. Physics of the air. McGraw Hill Book Company, New York.
5. SIGGERS, PAUL V. and R. M. LINDGREN. 1947. An old disease—a new problem. Southern Lumberman 175 (2201): 172-175.
6. U. S. DEPT. AGRIC., WEATHER BUREAU. 1938-1942. United States Meteorological Yearbook (Last five years available).

Spot-wise Direct Seeding for Redwood

Emanuel Fritz[1]
Associate professor of forestry, University of California, Berkeley.

This article reports the results of direct seeding experiments conducted by the author from 1934 to 1949. Spot-wise direct seeding was undertaken because of the poor showing of planted nursery-grown stock in the period 1922-1930. The results of direct seeding varied from near-failures to near-successes. Principal reasons for failure in the germination stage are reported to be late seeding; intervention of dry weeks during germination; loss of seed by being washed out and buried too deeply outside the spot during heavy rains; by soil being washed onto the seed spots; and the effects of animals. Principal reasons for mortality of seedlings are unfavorable summer weather, hard-packed exposed soil following slash fires, and rodents. The author believes that direct seeding has sufficient merit to encourage others to repeat the experiments.

THE INDIFFERENT SUCCESS of the extensive planting program in the California redwood region between 1922 and 1930, and the continuing need for an effective system of restoring fully stocked stands to old and to newly clearcut lands led the writer, in 1934, to attempt direct seeding. That year marked the beginning of large-scale experimentation to determine the feasibility of selective cutting and logging, first by the existing high-lead and slack-line logging systems and, in the following year, by crawler-tread tractors. Today, selective cutting and yarding with tractors is almost universal. In winter, when the ground is too wet and slippery for tractors, and on slopes that are too steep for tractors even in dry weather, the high-lead system will continue to be used, although Diesel yarders have generally displaced steam donkey engines. The slack-line system is now used only occasionally. Thus, some clearcutting, or almost clearcutting is still practiced. The cutover lands, being without seed trees, cannot be expected to reforest naturally and promptly and therefore need help from artificial reforestation. A complete change-over to a form of selective cutting and yarding that preserves 10 or more effective seed trees per acre may never be achieved unless unanticipated improvements are made in machinery, or new methods of using present equipment are discovered, and economic conditions favor much lighter selective cutting than is now practiced. The latter is a strong possibility.

In addition to the currently created cutover lands in need of some artificial reforestation, well under 1,000 acres per year, there is a vastly larger area, about 200,000 acres of good growing sites, accumulated during 40 to 50 years of steam logging, on which there are no seed trees. The vegetation cover is principally hardwood brush and scattered clumps of limby redwood stump sprouts. Reforestation of these old cutovers directed toward better stocking is second in importance only to perfection of current selective cutting methods.

Broadcast Seeding

Broadcast seeding was attempted in early 1935 with such poor results that efforts were concentrated on spot seeding. In February and March, 1935 six widely distributed plots in Humboldt and Mendocino Counties, varying from 5 to 51 acres each and totalling 141 acres, were broadcast seeded to redwood, at the rate of 1 pound of seed per acre. The seed was mixed with sawdust to facilitate hand sowing and distribution. Germination was so spotty that only a very low degree of stocking (less than 10 percent) could have been achieved. These plots had been logged clean by the slack-line or high-lead method and broadcast burned to remove the slash. All were surrounded by similar land. Such land, being fully exposed, devoid of humus, subject to premature surface dessication, inclined to be alkaline rather than acid, and too readily captured by solid stands of fireweeds, presents a very difficult seeding problem. Probably only a lavish use of seed would be effective in establishing a reasonably well-stocked forest. Broadcast seeding does not now seem to be an effective way of reforesting with redwood.

Extent of Spot-Wise Seeding Experiments

A total of 26 plots, varying from .125 acre to 7 acres, and aggregating 28.25 acres, were sown from 1934 to 1945.

In 1946 and 1948 additional experimental areas in Humboldt County, totalling 120 acres, were sown. Planned in part by the author, two are Hammond Lumber Company projects under the direction of that company's foresters, and one is a State Division of Forestry project. These should be made the subject of separate reports after the plots have passed their fifth year.

In addition, between 1935 and 1940 a large number of individual spots were sown under special conditions for special or temporary observation, and a large number of natural seedlings were staked at a number of stations for 1 or 2 years, or were dug up to study the root habits on various sites.

The plots were on recently logged and burned land, except that three were placed on slopes logged some years before and already heavily covered with brush species.

Unfortunately most of the plots in the Maple Creek region were destroyed by a great fire in 1945, while those on Van Duzen River were obliterated in the relocation of a county road. Nevertheless, each plot had yielded some useful data and information and contributed to the conclusions reported in the summary.

The results can be said to indicate that spot-wise seeding is a

[1] For assistance in seeding, acknowledgment is made to the late A. W. Elam, to C. O. Nichols, the California State Division of Forestry, and the California Redwood Association.

promising method of artificial reforestation. The present data, though inconclusive, are offered as a record of the writer's experience to date and for the assistance of private and state foresters currently engaged in continuing similar experiments.

Methods of Spot Seeding

The seed spots were prepared by raking the top soil to a depth of 1 to 2 inches. The seed was then sprinkled on the loosened soil and the surface was again raked to cover the seed. Finally the spot was lightly tamped with the foot. An excess of seed, from 50 to 200, was used to assure at least 10 to 20 viable seeds being covered not more than .25 inch and to provide for some loss from erosion. This required a rate of somewhat less than 1 pound of seed per acre of about 500 spots. The germination percent, obtained in cutting and blotter tests, varied from less than 20 percent to more than 40 percent. All seed was from the current crop of squirrel-cut cones.

A heavy garden rake, with the end-most tines cut off, was used on most of the plots. On others a McLeod fire tool rake was employed. The preferred and speediest seeding tool was a six-tined rake with a tubular steel handle. The hollow handle provided a reservoir of seed and a trigger released the desired amount of seed on the prepared spot. An asphalt-spreading rake, because of its weight, was found to be satisfactory for loosening the soil, but was clumsy to handle.

Some of the earlier plots, sown in 1934, produced low germination and were abandoned. Others were subjected to so much erosion the first year after logging that only a few spots remained. These also were abandoned, as were several destroyed in a fire in 1937. Plots seeded prior to 1940 are not reported here.

To give seedlings a better chance to establish themselves before the advent of the dry season, the spots in alternate rows of several of the Salmon Creek plots were first dug about 8 inches deep with a mattock, the lumps broken down, and the surface smoothed before seeding. When possible, seeding was avoided when the soil was moist enough to stick to the rakes.

General Description of Plots

All plots except one were in Humboldt County, Calif. All had been broadcast-burned for slash disposal. The original timber stands were from 50,000 to over 100,000 board feet per acre. Cutting was clean and no seed trees were left standing. Most of the redwood stumps had already sprouted, or sprouted shortly after the seeding. Some seed spots were located too close to these stumps, with the result that the long branches of the sprouts in 3 years reached over and shaded the closest spots. Yet, in spite of this shade, which was almost complete in 5 years, such seedlings as were found on the spots 5 summers after seeding, remained alive and in good color, but made very slow growth. This attests the very high ability of redwood to endure shade. It is likely that the heavy shade helped conserve soil moisture and thus compensated in part for the lack of light.

The herbaceous cover following slash disposal consists generally of the domestic fireweed (*Epilobium angustifolium*), imported fireweeds from Australia and New Zealand (*Erechtites prenanthoides* and *E. arguta*), coyote brush (*Baccharis pilularis*), tanoak (*Lithocarpus densiflora*), wax myrtle (*Myrica californica*), thimble berry (*Rubus parviflorus*), salmon berry (*Rubus spectabilis*), and several species of Ceanothus, generally *C. thyrsiflorus* and *C. parryi*. Iris and sword fern constituted occasional clumps. The fireweeds are able to make almost solid fields in the first year and thereafter are gradually replaced by the woody shrubs.

Redwood (*Sequoia sempervirens*) was the principal species sown. Douglas-fir (*Pseudotsuga taxifolia*) and Port Orford cedar (*Chamaecyparis lawsoniana*) were represented in some of the plots. On the larger plots, spots in every other row were staked for examination. At time of examination, the unstaked rows were examined for comparison. The staked rows proved to be adequate and representative samples. The seed spots were spaced 6 by 6 or 8 by 8 feet. Where large stumps, chunks, and rotten logs occured one or more spots had to be omitted. The crews were instructed to take advantage of the shade of slabs, chunks, and smaller stumps. Thus some spots were on open ground, some close to iris and fern clumps, some alongside chunks, and some in openings among large-sized debris.

The redwood region experiences heavy rains in winter, frequently of sufficient force and volume to damage freshly raked spots. Generally these heavy rains effectively remove visible slash-fire ash and leave the soil quite bare and "raw."

At any time between January 1 and the end of the wet season, about June 1, a dry week or two may be experienced. If germination has started just before a dry period, mortality of seedlings is heavy.

Heavy rains cause soil to wash upon the seed spot, burying the seed too deeply; or, they may wash the surface from the seed spot, carry off the seed and bury it too heavily below the spot. The importance of this was not appreciated on the early plots. Later the crews were instructed, though without complete success, to prepare the spot so as to minimize washing and over-deep burial of the seed.

Slopes of the plots varied from quite flat to fairly steep; north and south exposures were represented. Soils varied from heavy clay to loam, from dry to moist, and all had been severely damaged by slash-disposal fires. No attempt was made to isolate any one of the many factors that may have affected germination and establishment.

Survival

A seed spot was considered successful at the time of inspection if it had on it at least one seedling of such thrift and location as to warrant the assumption that, barring subsequent rodent or other damage, it had a reasonable chance

to survive and become definitely established.

Highest survival was obtained from early seeding. However, this may not hold true in some future years because the severity of rains for long periods may cause enough local erosion to nullify the advantage of early seeding.

Many spots produced no germination at all. Others produced from 1 to 30 seedlings. Mortality begins early, the apparent principal cause being early surface dessication after the rainy season. For example, Table 1 shows 64.8 percent successful spots in the first summer and 55 percent in the fifth. In other words 35.2 percent of the spots failed to produce a single seedling the first season, but of these 85 percent were still successful in the fifth. Of the 210 seedlings found on the 81 successful spots the first summer, 63 percent were thrifty in the fifth. The importance of great care in preparing the spot and distributing the seed to attain a larger percent of successful spots in the first season cannot be overemphasized.

For purposes of comparison the results on two plots are given in Tables 1 and 2.

TABLE 1.—RESULTS OF DIRECT SPOT-WISE SEEDING OF REDWOOD ON MODERATELY STEEP EASTERLY SLOPE, SEEDED JANUARY 10, 1941

	Dates of examinations					
	7-28-41	3-6-42	7-28-42	10-4-43	6-29-44	7-30-45
Number of spots in alternate rows	125	125	125	123[1]	121[1]	121[1]
Number of spots successful	81	75	76	69	67	66
Percent successful	64.8	60	60.8	56	55	55
Percent of spot survival; first count, or 81 = 100%	—	92	93.8	85	85	85
Total number of seedlings in successful spots	210	166	162	137	127	126
Percent of seedling survival 210 = 100%	—	79	77	65	63	63

[1] Two spots eliminated by crown spread of stump sprout. Spots covered by branches but seedlings alive.

TABLE 2.—RESULTS OF DIRECT SPOT-WISE SEEDING OF REDWOOD ON GENTLE TO STEEP NORTH SLOPE, SEEDED JANUARY 10, 1941

	Dates of examinations					
	7-25-41	3-5-42	7-28-42	10-4-43	6-3-44	7-30-45
Number of spots in alternate staked rows	127	127	127	127	127	126[1]
Number of spots successful	72	58	53	45	44	43
Percent successful	56.7	45.7	41.7	35.4	35	34
Percent of survival; 72 = 100%	—	80.5	73.6	62.5	61	61
Total number of seedlings	167	114	103	85	83	81
Percent of seedling survival. 167 = 100%	—	68.3	61.7	50.9	50	50

[1] One spot eliminated because of stump sprouts and basis changed to 126.

Spacing and Cost

The important factor in spot-wise seeding, aside from direct cost, is the number of successful spots one can expect and the resulting degree of stocking. If there are 500 well-distributed saplings per acre, the stocking should be sufficient for redwood, as is also a 9-by-9-foot spacing. Since many redwood stumps will sprout, the resulting sprout clumps and the space they occupy will have to be taken into consideration. Natural sprouts may reduce the required number of successful seed spots to 400. Allowing for spot failures of 20 percent, the spots to be planted will then number approximately 485, with the spacing about 6 by 6 feet or less, depending on the size of the mother stumps and their proliferation and the obstructions occasioned by chunks and tops.

An experienced man should be able to seed 800 spots, or one acre per day. About 0.75 pound of seed is sufficient. It is believed that it is cheaper to space the plots closely at the outset to obviate the necessity of re-seeding fail spots.

Extended Summary of Deductions

Plot descriptions and detailed results for the many direct seeding experiments conducted by the author in the past 16 years are on file in the University of California forestry library.

From the standpoint of the possible success of region-wide direct spot seeding the following general deductions and conclusions may be made.

1. The seed must be good. In the case of redwood the best seed, with 20 to 40 percent germination capacity, comes from fresh squirrel-cut cones.

2. The seed must not be buried more than 0.25 inch.

3. Since seed is cheaper than labor and meticulous care in placing the seed would be expensive, enough seed should be sown per spot to compensate for "blind" seeds and those that will be buried too deeply when raked in, so that from 10 to 20 viable seeds are reasonably certain to be in the top 0.25 inch of soil.

4. Soil dessication in the top half or full inch caused by a dry week during germination is lethal. The surface becomes a hard crust in which the still partly bent hypocotyl becomes imprisoned and, if not released by a rain, the seedling will die.

5. Since most of the cutover land slopes are rather steep, spots must be so prepared that there is least likelihood of soil washing over the spot from the cut "cliff" above the spot and embedding the seed too deeply, and that the spot itself will not wash out.

6. Seeding should be done well before April 1. Some redwood seed will hold over for a year. Germination, in some years, begins in January. Seedlings germinating after April 1 may not have time to extend their roots into soil areas having sufficient water throughout the long dry season. The dry season starts about June 1. Early seeding is more subject to damage by the heavy rains of some years, but is worth the chance.

7. Barring fires, grazing, and

rodent damage, a seedling fortunate enough to survive the first two seasons has a very good chance of becoming permanently established.

8. For germination, redwood does not require shade or mineral soil. It will germinate on shaded and unshaded soil, and on mineral soil, logs, in debris, and under other vegetation, provided the required moisture is available. To survive after germination, it must have adequate moisture during the dry season. After germination, shade becomes important. Exposed soil reaches temperatures as high as 140° on hot days. On the shady side of chunks it is considerably less. Barring concurrent excessive desiccation, the seedling can withstand 140°. Shade reduces evaporation and conserves moisture in the top soil layers. Seedlings starting adjacent to slabs of wood or chunks have most of their roots under such moisture-conserving objects. Seedlings generally do better on mineral soil because of its freedom from competing roots. If these roots are not killed in a slash fire and the plant sprouts a new top, they may draw away enough moisture from the top 3 or 4 inches to deprive the seedling of its water requirements. Redwood seedlings are more demanding in this respect than Douglas-fir or Port Orford cedar seedlings.

9. Redwood can endure the dense shade of limbs from nearby stump sprouts, even though these limbs rest almost on the ground. Should a seedling in the open find sufficient moisture, it will outstrip one under the shade of shrubs.

10. Seedlings will start naturally or can be started artificially on old cutover lands under head-high native shrubs, and can maintain a healthy condition but their height growth is very slow. Once they have equalled the shrubs in height they can accelerate height growth and ultimately smother the shrubs.

11. Soil that has been deeply disturbed by cultivation, or by being moved, as for example on roadside shoulders, railroad beds, and bulldozer overcasts, provides a better growing site than a soil in its naturally compacted state. Most redwood soils from which the humus has been burned are quite hard and dense. Although their surface in some cases becomes friable on exposure, it is difficult for initial roots to penetrate them. In these experiments seed spots gave better success, in general, when the soil was loosened to a depth of 8 inches. A 1-year redwood seedling may have roots only 3 inches deep on natural compact soil, but on loosened soil the roots may be more than 12 inches deep and much branched.

12. Some negative influence may derive from a change in the soil from acidity to alkalinity because of the slash ash. Yet, seedlings often start abundantly on the site of a burned debris pile. Slash fires, though perhaps injurious to the soil, do remove other vegetation from competition.

13. The fireweeds often cover burned cutover lands solidly. Redwood seedlings apparently can withstand their competition. After the first year the fireweed stands thin out quickly. Natural regeneration, where there was a copious supply of seed, has been excellent on such areas and has developed into young forests of at least 70 percent stocking. *Baccharis* appears to be a helpful "nurse" crop rather than a handicap. The fireweeds and *Baccharis* are temporary cutover land occupants, as are also willows and ceanothus. The latter two are more serious contenders than the fireweeds and *Baccharis*. Tanoak can withstand considerable shade and is a very undesirable invader.

14. Frost-heaving occurs infrequently, and rarely on other than north slopes.

15. Rodents find and consume some of the redwood seeds. After germination they do considerable damage. Brush rabbits, in particular, eat off the tops. The large gray squirrel and the pack rat apparently do no damage until the tree has passed the sapling stage. Thereafter squirrel damage may be serious though spotty. Rabbits may eat 1-year-old seedlings, although there is no proof of it. If the seedling is not eaten off below the line of the cotyledons it is not necessarily killed, and is very likely to re-sprout. Deer and cattle browse seedlings that are more than a foot high. Quail find the prepared seed spots desirable dusting beds.

16. Mortality of seedlings is heaviest during the first year. Thereafter it drops off rapidly (Tables 1 and 2). It is therefore desirable that each seed spot have on it several to many seedlings from the time of germination. One spot had 30 seedlings a few months after seeding and 21 in the second year.

17. Some spots on very hard stony soil bore up to seven seedlings, others none at all. Some seedlings developed well in dense clumps of Iris. Viable seed may be lost to birds and rodents or to excessive burial, while the seedlings may succumb to a moisture deficiency, to slugs, snails, birds, or rodents. An otherwise well established seedling may be destroyed by the trampling of animals or the boots of hunters and interested visitors. Weeds that may be a desirable factor when green and standing, may prove lethal when dead and flattened into a thick suffocating mat over the seedlings.

18. Recognizing the importance of losses, perhaps spacing should be so reduced that the indicated mortality will leave 500 seedlings per acre after 5 years of age. This number, if well distributed, and allowing for natural sprouts, should provide close to 100 percent stocking when the seedlings have become saplings.

19. Seed spotting shows promise of greater success than the planting of nursery-grown stock, if the mortality of planted stock in the 1920's is a fair criterion. Certainly it is cheaper. It appears that redwood seedlings are so sensitive to transfer from the nursery to the field that they succumb readily on average exposed sites. Damage to the roots is inevitable. The balance between root and crown is disturbed. Seedlings germinated naturally on the final site suffer no such damage and there is a consistent balance between top and root. Seed spotting can provide more than one seed-

ling per spot, thus allowing for mortality, whereas planting offers but one seedling per spot.

20. In contrast with broadcast seeding, seed spotting provides for coverage of the seed and for the selection of congenial spot sites.

21. Damping-off disease is apparently not important; none was noticed on the experimental plots.

22. Seed spotting within 8 or 10 feet of a sprouting old-growth stump should be avoided.

23. It is suggested that further study be made of (a) deeper soil preparation, (b) seeding on an unloosened surface (cleared of vegetation) and the seed covered with 0.25 to 0.5 inch of shredded redwood bark screenings, peat or similar material, and (c) earlier seeding, starting in September. Screening the seed spots has not been found to add to success.

24. Among other species in the experiments, Port Orford cedar gave the greatest degree of success up to the tenth year. Seedlings start readily, although many seeds hold over for one season. The 1-year seedlings are very small, but they develop rapidly and even surpass redwood in height growth. Douglas-fir is a satisfactory associate in the new redwood forest. It was less successful than the redwood on the seed spots. Its larger seed is a more choice morsel for seed-eating birds and rodents. In height growth the seedlings equal redwood. Two exotics that appeal to the author as promising are blackwood acacia and ailanthus. Both do well in the redwood region as shade trees. The acacia performed well on one plot where it was sown. The ailanthus is still under trial on a new plot. Yellowpoplar also shows promise on the same new plot. It is very desirable that some hardwoods of high utility be added to the new redwood forest. The West is peculiarly poor as to hardwoods of desirable tree form and wood characteristics.

Conclusions

Spot-wise seeding for redwood shows promise of greater success and less cost than planting. Extra care must be exercised in the preparation of the spots and in the seeding, and the spots should be spaced 6 by 6 feet or less to obtain the desired distribution after normal mortality. Early seeding (January and February) is preferred to later spring seeding. Further experimentation is desirable to determine desirability of seeding in the autumn, of mulching the seed spots and of loosening the soil prior to seeding.

In Appreciation

Alfred Rehder (1863-1949)

Alfred Rehder, retired curator of Arnold Arboretum and Professor of Dendrology at Harvard University, died July 21, 1949 at his home in Jamaica Plain, Massachusetts.

The January 1950 issue of the *Journal of the Arnold Arboretum* reported the death in an article by the editor recounting briefly the life and complete bibliography of Professor Rehder.

Professor Rehder was best known to foresters through his *Manual of Cultivated Trees and Shrubs in North America* published in 1927 and by his contributions to C. S. Sargent's *Trees and Shrubs of North America*, 1909. In this latter work he presented the data for 91 species. Published a month prior to his death was his *Bibliography of Cultivated Trees and Shrubs*.

Arriving in the United States from Germany in 1898 he attracted the attention of Professor C. S. Sargent, director of the Arnold Arboretum, who recognized the potentialities of this untiring botanist and horticulturist. His first major task was to gather data for the *Bradley Bibliography*. It listed all publications, articles, and other writings in all languages dealing wholly or in part with woody plants published until the end of 1900.

In 1918 he became curator of the Arnold Arboretum herbarium, and in 1919 as a result of his urging the *Journal of the Arnold Arboretum* was initiated. Professor Rehder became its editor in 1926, a post which he held until his retirement in 1940.

American foresters have lost a great friend and dendrologist in Alfred Rehder. His plant descriptions and numerous papers, over one thousand, will always be referred to and respected by foresters the world over.

SAMUEL W. ANTHONY,
Department of Forestry,
The Pennsylvania State College.

Needed: A Research Program In Forest Owner Education

Charles H. Stoddard
Consulting forester, Minong, Wisconsin.

ALMOST SINCE THE beginning of American forestry, great emphasis has been placed on education as the most effective means of translating forestry theory into forestry practice. But no two foresters will agree on the meaning or methods of "education." To most of us, the word carries the vague idea of converting the forest owner from the villainous role of clear-cutter to that of a careful husbandman of the forest. This conversion process may take place over a bar with the more sophisticated forest owners, or over the back forty fence with a dirt farmer.

The only reliable index we have on the relative success of education is the extent to which some sort of consciously directed forestry program is applied to private forest lands. The Reappraisal report of Forest Service[1] showed that in 1945, one hundred and thirty-six million acres were owned by nearly one million non-resident or absentee owners.

Forest management practices on a large majority of non-resident owned lands and farm woodlands were found to be well below the minimum for even a "fair" classification. Clearly the efforts to improve management on these lands had not borne fruit when so little evidence of conscious forestry could be found. Over two-thirds of the forest cutting on private lands have been classed as unsatisfactory to poor in quality.

Although there is considerable dispute over such measures as regulation and subsidy, nearly everyone agrees that more education is needed. Yet when everyone agrees on something which is obviously not measuring up to expectations, after several decades of trial, there is obviously something wrong. Each year public and private agencies alike go before Congress to urge more money for education. It is said that our present efforts are insufficient, more foresters are needed in the field to contact more owners, more films, slides and pamphlets are required, etc. No one ever asks why more of the same dosage is prescribed when the patient has not shown much visible improvement. Perhaps, it is time to do a little research on the doctor, on the medicine, and on the patient.

Forest owner education program is carried on principally through the state extension foresters and the Norris-Doxey farm foresters who work mainly with farmers and small owners, and the U. S. Forest Service division of state and private forestry with larger industrial owners. In addition, numerous private and quasi-public agencies carry on various programs, general fire prevention and forest practice promotional work with individual landowners. Practically all these programs at the owner level involve field demonstrations either for the individual owner's benefit or at group meetings. Follow-up work is necessarily limited because of personnel restrictions. Most Norris-Doxey foresters can barely scratch the surface in their communities and their work is limited to those few owners who show the greatest interest. Although some excellent progress has been made in instituting better management on a few holdings, most of the extension foresters will admit that there has been no widespread improvement over their whole area. And these are the areas which are given the greatest emphasis in education effort.

Prescriptions for the cure of unwise forest handling have included the personal contact and advisory approach. This advice usually embraces direct contact with the owner by foresters on the ground, and such indirect methods as bulletins, field demonstrations, movies, and fair exhibits. These voluntary appeals are followed with the blithe assumption that owners will return home and put them into effect. Left out of consideration is the fact that few small owners (especially non-residents) have operating facilities on their forests.

To their great credit, the field men are doing their level best and with much enthusiasm; but, even if these men were multiplied by ten (which some people advocate), the nature of forest ownership and the tools with which they work are great obstacles in their path. The doctor is well-trained and has high professional zeal, but his diagnosis may be faulty and consequently his prescription inadequate.

The whole forest owner educational program has followed the pattern laid out by the agricultural extension program. We have made the same assumptions that the forest owner is analogous to the farmer, living on or near his land and planting and harvesting his crops as they ripen. An examination of the institution of forest ownership shows this assumption to be largely incorrect. The failure of educational programs may hinge chiefly on this mistaken concept.

But actually who is the forest owner? Only recently have we begun to dig into the real facts behind forest ownership. Studies made in the Lake States, the South, and in California are beginning to reveal some pertinent facts. Some farmers may own their farms in fee simple; some have mortgages, and some are tenants. Educate the first group to good forestry, for they are free agents, and you have forestry established, for awhile. But if the fee owner sells his farm and takes a mortgage, you have a man who will be under pressure to cut all the timber to pay off the mortgage. In the case of the tenant farmer, not he, but an absentee owner, possibly a group of bank directors, will have to be converted.

The other large group of individual owners are the non-resident or absentee group. Some very interesting data have been turned up recently on these. Many are involuntary owners. Others are incidental land holders. Some are recreational users and still others are speculators. Very few of these owners have a long-term interest in

[1] U. S. Forest Service. Reappraisal of the Forest Situation, Report 3, the management status of forest lands in the United States, 1946.

forestry; and even if they did, they live so far from their lands and are occupied elsewhere that they can't practice frequent light cuttings. A large majority sell timber on a lump sum, clear-cut basis. Educating this group is extremely difficult by reason of their distant residence and general lack of interest or ability to carry out long-term forest management policies.

And finally, the institutional owners—wood processing concerns, mining companies and other corporate holders—are usually in the business of using the land and are becoming aware of the need for better management. Education has helped in this awakening, but one suspects that the liquidation cycle has run its course in most of the eastern United States and timber growing offers the only alternative to a firm intending to stay in business. Education can and is helping these groups. Most are in the business to stay and are continuous entities. Corporate officials come and go, but the company usually stays on. It is with this group that the greatest progress is being made. Major concern is with the smaller individual holding.

In retrospect we find we have a large and heterogeneous group of individual small owners. Some are pressed for cash. Others are not pressed, but long term forestry does not have financial appeal. All are men with definite life tenure whose policies may be reversed the minute their lands change hands. But perhaps the most strategic fact about forest ownership is that *most of the owners themselves do not actually operate their forest land in the same way as does a farmer.* Most forest operations are conducted by contractors or timber buyers who perform the actual forest operations. Even in the case of farmers, large numbers of them employ outsiders to cut their timber or else sell it for a lump sum.

Cope[2] has analyzed quite thoroughly the effect of the functioning public forest owner-education programs and found that by and large they were not getting at the fundamental problems. Forestry was still a "hit or miss" practice on most lands. Principle failure seems to stem from the fact that *most programs lack long-term continuity* which is so necessary to forest management. Although Cope felt that the direct service programs such as the Soil Conservation Districts and Agricultural Conservation Program payments smacked too much of subsidy, he found that the former were fairly successful in obtaining a wide application of improved forest practices.

A thorough re-examination of our forest owner-education techniques should be in the form of research projects which will probe in considerable detail the relation of the forest owner to his land. A rather fundamental analysis is required involving phychological techniques, studies into the tenure relationships of forest land, factors influencing forest owners' decisions, actual operating facilities available, financial and economic factors affecting owners. This phase would throw much more light into the nature of forest ownership and its problems.

From another aspect, the educational programs should be examined in detail to find out how they actually work on the ground in terms of applied forestry and where their shortcomings are in terms of the information obtained in the first phase of the investigation.

Without attempting to supply answers at this stage, certain facts do stand out. Our existing programs are based too largely on the assumption that the forest owner is tied as closely to his land as is the farmer and hence he is an operator. Obviously, in a large proportion of cases he is not.

A second concept which we too often forget because we are short-lived human beings, is that *forest land management requires time and continuity of policy.* Yet, our system of individual land ownership in which land may change hands several times in a rotation does not lend itself to continuity of management. Furthermore, much forest land is held in blocks too small for economic operation.

The Twentieth Century is a period of organization. A small enterpriser must have the benefit of joint assistance if he is to compete economically with corporate giants. Farmers have their cooperatives, the small grocers have their central buying groups and there are many others, but the average small forest owner is not a resident operator, nor is he familiar with markets. This may be one reason why forest cooperatives have had only limited success. It is probably one reason why forest owners have not been changed perceptibly by educational techniques.

A solution for this problem must take into account the organizational need. Without attempting to prescribe a remedy, the apparent requirements for an adequate program of public assistance to private owners would seem to include:

1. Formation of local land management service organizations to which private owners may turn for purposes of carrying out actual forest operations on the ground.
2. A continuity of purpose over the years by this organization in order to carry out long term forest management programs with and for owners.
3. An agreement with owners which will bind the land to a long range plan, regardless of ownership changes, to protect any public investment made whether it is in the form of technical assistance or actual public conservation works on the land.
4. Agreements between this local organization and the federal and state agencies capable of providing technical, financial and operating facilities to individual owners.

This type of organization could function in several ways depending upon the situation of each owner. It could provide preliminary technical examinations and a complete timber inventory and management plan. It would carry out actual forest operations and market wood products if the owner so wished. Wherever available, the services of consulting foresters should be employed. Wood using industries could enter into agreements with this organization for a part of their wood requirements

[2] Cope, J. A. Farm forestry in the eastern United States. Chas. Lathrop Pack Forestry Foundation. pp. 43. 1942.

and local contractors could be employed by the agency for actual operations.

Functioning as an organizational medium between public bureaus and private owners, this local agency could provide the operating vehicle which most private owners so desperately need and which mere education fails to touch. In the case of soil conservation where programs dealt with farmers living on the land, it was found that a district organization was necessary for program continuity. Foresters have made much for years of the analogy between tree crops and farm crops, yet have failed signally to participate in the action programs in agriculture where common interests lie. Only thorough investigation will show whether soil conservation districts, for example, can be adapted to a forest operating service program. Yet it is probably very essential that we employ existing facilities to further our forestry program rather than further to confuse the public with possible additional overlapping. This is particularly true at a time when the old line departmental agencies are concerned over the fact that the valley authority concept has many people convinced of its superior efficiency in promoting conservation.

No time should be lost in launching this program of research. Advocates of more and ever-more educational programs are urging greater and greater appropriations to put more technical men in the field. Opponents of this expansionist program fear increasing numbers of public foresters "telling them how to run their own business." Neither group has done the really fundamental groundwork needed to regear present educational programs to the realities of forest owner relationships.

This is the task of a research program free of a promoter's bias or allegiance to any agency program.

Some Factors Affecting Humus Development in the Northeast

Richard S. Sartz and William D. Huttinger

Foresters, Pacific Northwest Forest and Range Experiment Station, Portland, Oreg., and Northeastern Forest Experiment Station, Upper Darby, Pa., respectively.

BECAUSE THE flood problem is increasing and siltation and water-supply problems are becoming critical, the role of humus in watershed management is now receiving more recognition than formerly. Humus is important because its great capacity to absorb water enables it to deter runoff after heavy rainfall. It protects the surface soil from the impact of heavily falling rain, and thereby prevents puddling and clogging of the soil pores, and allows free entry of the water into the underlying soil layers.

Because of the many influencing factors such as climate, soils, vegetation, geographic location, and man-caused disturbances, the analysis of humus data becomes a complex problem. It is recognized that the amount of humus developed under a forest will vary with the latitude and altitude and the associated differences in climate and vegetation (*2*). The basic relationships within a like environment, however will be the same.

For the past several years studies have been made in the Northeast by the Northeastern Forest Experiment Station, U. S. Forest Service, on the possible factors that influence humus development. The purpose of this article is to make known the results of these studies and to point out the importance of the findings to the application of watershed-management practices.

The data presented in this paper were collected on the Allegheny River drainage area in southwestern New York and western Pennsylvania. Supporting information was obtained from surveys covering most of the Northeastern States.

Sampling Method

The data were collected on randomly selected plots distributed throughout the 11,700 square miles of the Allegheny River watershed. In this area the soils are of the gray-brown podzolic group with a smaller area of podzols on the higher Allegheny Plateau. The principal forest types are northern hardwoods and oak. Lesser areas are occupied by white pine-hemlock and temporary types such as aspen and pin cherry.

A field data form was used on which were listed all factors believed to have an influence on humus development. Some of these items were: Soil drainage and texture class; stand age and stocking; topographic position; aspect; slope; forest type group; and man-caused disturbances. These factors were determined on a 0.1-acre area around the plot center, the area believed to reflect the conditions responsible for the humus observed. Humus types were noted and the depths were measured to the nearest 0.1-inch at the plot center and at a point 6 feet north of it.

Stand age and stocking[1] were determined from the dominant trees. Three stocking classes based on percent of crown closure were recognized: Good, in which 70 to 100 percent of the area was covered by tree canopy; fair, in which 40 to 70 percent of the area was covered; and poor, in which less than 40 percent was covered.

As used here, humus is the upper

[1] Stocking and density, as used in this article, refer to the degree of crown closure rather than the measurement of volume.

portion of the forest floor consisting of decomposed or partially decomposed organic matter which may or may not be mixed with the mineral soil as distinguished from the fresh organic residue (litter) *(1)*. Humus type was classified according to the nomenclature proposed by Heiberg and Chandler *(1)*. The two main types recognized are:

Mull.—A humus layer consisting of mixed organic and mineral matter. Transition to lower horizon not sharp.

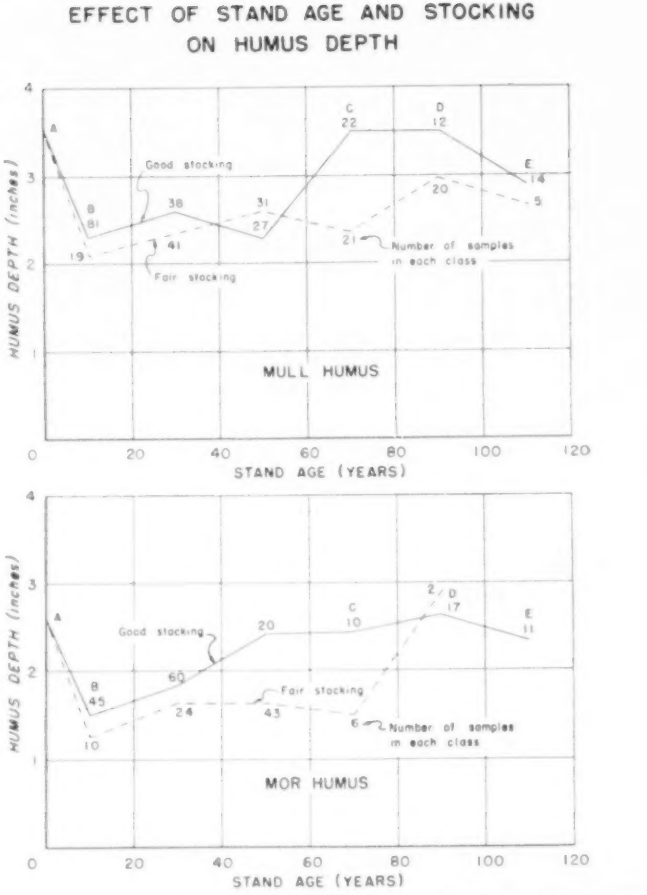
Mor.—A humus layer of unincorporated organic material, usually matted or compacted or both, distinctly delimited from the mineral soil unless the latter has been blackened by the washing in of organic matter.

Such organic layers as peats or mucks found on very poorly drained soils are not included in this discussion.

Factors Affecting Humus Development

Although the annual accumulation of litter is obviously a function of the forest stand, the total forest floor, including litter and humus, is an algebraic sum of leaf and twig fall and current accumulation plus the weathering and biotic and chemical factors that bring about decomposition *(5)*. Thus, humus is of a dynamic nature; it is continually undergoing changes brought about by the agencies of accumulation and decomposition *(3)*. The degree to which these agencies exert their influence is controlled largely by stand conditions and other related factors.

Stand age.—The length of time a stand has occupied a given site was found to be a significant factor in humus development (Fig. 1). After a preliminary decline due to the removal of forest cover, the buildup of humus in a young stand is slow because the difference between accumulation and decomposition is small. As the stand grows older and the amount of the raw materials increases, the effects of decomposition are overcome and a deeper humus results. The depth increases with the age of the stand until equilibrium between accumulation and decomposition is reached. This is probably the point at which the maximum tree volume increment is reached *(2)*. The subsequent period shows a gradual decrease in depth because the stand has passed its peak production of leaf fall.



NOTE: A, Humus depth of former stand, prior to logging. A-B, Period of organic decomposition following logging. B, Point where decomposition and deposition are equal. B-C, Period of greatest humus development. C-D, Period of greatest humus depth. D-E, Decrease of humus depth due to overmature stand.

FIG. 1.—Effect of stand age and stocking on humus depth.

Stocking.—The effect of stocking is shown in Figure 1. Though data for poorly stocked stands are lacking, conclusions may be drawn from the comparison of good stocking with fair stocking. At a given age, humus depths tend to be greater under well-stocked stands. Stand density exerts its influence on humus development in several ways. Heavier stocking means greater leaf fall, consequently more organic matter is returned to the forest floor each year; a more dense canopy means less sunlight reaches the forest floor, hence lower temperatures and slower decomposition as lower temperatures create conditions less favorable for oxidation, which is a primary process of decomposition *(2)*; a dense stand minimizes the erosive effects of wind. As a result, a deeper humus develops under good stock-

ing than under poorer stand conditions.

Logging.—The influence of logging on humus depth varies according to the severity of cutting. A clearcutting operation not only removes the source of humus-building materials, but allows accelerated decomposition and erosion to take place. The forest floor decreases in depth until the rate of accumulation from the new stand begins to overbalance the rate of decomposition. Figure 1 shows the age at which this occurs, according to stocking conditions and humus type.

Though no data are available, the amount of advance reproduction present would seem to be an important factor in the rate of humus decrease. It is not yet known whether better humus conditions can be maintained by frequent light cuttings or by less frequent, heavier cuttings. Here, the physical effects of logging operations would be an important consideration.

Fires and grazing. Both fires and grazing may cause deterioration of the stand with a resulting decrease of humus; both may cause physical destruction of the humus layers. The degree of damage varies, however, with intensity and frequency or duration.

It was found that light burns destroyed only the dry litter, but had no apparent effects on the depth of the humus. Severe burns completely destroyed the organic layer. Frequent burns, though not severe, may eventually kill all forest cover; then the humus layers disappear, either by the forces of decomposition or through wind and water erosion following the removal of the protective cover. Humus measurements taken in burned areas revealed wide variations from one spot to another, probably because of the erratic nature of fire.

The direct effect of grazing is compaction or destruction of the organic layers by the trampling of the animals. In continuously and severely grazed stands, the effect of compaction may be such that the loose, granular structure of a coarse, medium, or fine mull type of humus becomes dense and compact, typical of a firm mull.

Of 173 grazed plots studied on the Allegheny watershed, 42 (24 percent) had a firm mull or no humus at the sampling point. However, of the 43 samples of firm mull encountered, 33 (77 percent) occurred in grazed woods. Here too, wide variations were found within a single woodlot, the greatest compaction being on the most travelled areas, and the least on inaccessible areas.

Topographic factors.—Slope, aspect, and topographic position may have an influence on humus development, but the number of observations taken on the Allegheny watershed was insufficient to bring out any conclusive differences attributable to these factors. A significant trend was shown, however, that northeast slopes develop a deeper humus than other slopes. Since northeast slopes receive less intense sunlight and are cooler, this might be expected. Although a rather definite trend was found for mull humus, the data for mors showed no correlation. Table 1 illustrates the trends found. Only those age-stocking groups having a reasonable aspect distribution are listed.

The effects of microtopography on humus depth are more pronounced. In many places windthrown trees and decayed logs and stumps have created a series of minor depressions and humps. The action of wind and water tends to fill up the depressions with organic matter from the humps. In several places, depths of 14 inches of granular mor were recorded under a young pole timber stand. This accumulation of organic matter was not formed in place, but had been water-borne into a depression. Conversely, in several instances, no humus was recorded under old stands of mature trees because the sample points fell on small hillocks which were swept clean by the action of wind and water. As a result of such phenomena, humus depths ranging from 0 to 14 inches were observed within a distance of 6 feet.

Soil factors.—Soil depth and drainage[2] were found to have no apparent effect on either the type or depth of humus where the upper soil horizons were well drained. Where peat or muck types of humus had developed on poorly drained or permanently wet soils, the relationships observed on well-drained soils were not found.

TABLE 1.—INFLUENCE OF ASPECT IN DEPTH OF MULL HUMUS

Stand		None (level ground)		NE		NW		SE		SW		Average[1]
Age	Stocking	Samples	Depth	Samples	Depth	Samples	Depth	Samples	Depth	Samples	Depth	Depth
		Number	*Inches*	*Number*	*Inches*	*Number*	*Inches*	*Number*	*Inches*	*Number*	*Inches*	*Inches*
100	Good	6	2.35	6	3.65	5	2.68	5	2.22	--	--	2.73
81–100	Fair	8	2.40	11	2.85	4	2.28	--	--	3	2.77	2.58
21–40	Good	8	2.88	14	3.86	13	2.34	11	2.25	21	2.09[1]	2.47
21–40	Fair	13	1.78	13	2.95	10	2.45	6	2.17	11	1.95[1]	
Average[1]	Good	--	2.63	--	3.76	--	2.51	--	2.24	--	2.03	2.64
	Fair	--	2.09	--	2.90	--	2.37	--	2.17	--	2.36	2.37
Average, all stands[1]		--	2.35	--	3.33	--	2.44	--	2.21	--	2.26	2.52

[1] Unweighted.

[2] Topographic positions used: Ridge top, upper slope, lower slope, bottomland.

[2] Soil depth and drainage classes used: Deep, well drained; shallow, well drained; imperfectly drained; poorly drained; and permanently wet.

Inconclusive evidence indicates that a deeper humus layer will develop on medium than on light-textured soils and that decomposition of the humus following removal of the stand is more rapid on light-textured soils than on medium. This may be explained by the fact that water movement and the accompanying leaching of organic substances is faster in sandy soils than in those of finer texture.

Summary and Conclusions

Some of the important factors affecting the development of forest humus layers in the Northeast have been brought to light during the course of flood-control survey investigations being made in this region. Evidence has shown that the depth of humus increases with the age of stand until maximum foliage production is reached, and that humus depth is directly correlated with stand density. Although age is largely the expression of total organic matter accumulation, density (which is a measure of the amount of foliage) controls the balance between organic accumulation and decomposition. Logging, fire, and grazing have destructive effects on humus layers, depending on their intensity and frequency or duration. Evidence was found that northeast slopes develop deeper humus layers than other aspects and that microtopographic features caused extreme variations in humus depths. In addition, inconclusive evidence showed that less humus is likely to develop on sandy soils than on heavier-textured soils, other factors being equal.

With increasing emphasis being placed on watershed values of forested lands, effects of management practices on forest floor conditions require a closer attention by forest managers. On lands where control of the water resources is of vital concern, management should be directed, where silviculturally sound, toward maintaining well-stocked vigorous stands and avoiding unduly large canopy openings. The cutting of immature stands should be limited to improvement cuts, thinnings, or other measures that will insure perpetuation of a good forest cover. A high level of fire protection and restriction of grazing are essential to keep the forest floor in the most desirable condition for water infiltration and storage.

Literature Cited

1. HEIBERG, S. O. and R. F. CHANDLER, JR. 1941. A revised nomenclature of forest humus layers for the northeastern United States. Soil Sci. 52 (2):87-99.
2. KITTREDGE, JOSEPH. 1948. Forest influences. 394 pp. McGraw-Hill Book Co., New York.
3. LUTZ, HAROLD J. and ROBERT F. CHANDLER, JR. 1946. Forest soils. 514 pp. John Wiley and Sons, New York.
4. MOREY, H. F. and G. R. TRIMBLE, JR. 1941. Age of forest stand humus depth relationships and their application to the flood control problem. (Unpublished manuscript, Northeastern Forest Experiment Station.)
5. WAKSMAN, S. A. 1932. Principles of soil microbiology. Ed. 2, 894 pp. The Williams and Wilkins Co., Baltimore.

Yields from a Managed Pine Forest

A recent inventory of the Cutfoot Experimental Forest in northern Minnesota which represents conditions on the better stocked pine forests of the state shows annual earnings of $3 to $4 per acre as stumpage or $9 to $10 as logs and bolts. Paul Zehngraff, silviculturist, Lake States Forest Experiment Station, reports that on 2,346 acres of management area there was an average stocking per acre of 1,904 cubic feet, or 5,655 board feet plus 6.4 cords. Annual growth on the tract was found to be 551,000 feet (Scribner rule for trees 7.6 inches d.b.h. and larger) plus 364 cords (to a 3-inch minimum top). This was equivalent to 235 board feet and .16 cords per acre. Monetary values used in computing the dollar-return are $15 per thousand board feet and $1.50 per cord for stumpage; and $32 per thousand board feet and $14 per cord for logs and bolts.

A Method of Forecasting Annual Variations In Seed Crop for Loblolly Pine

Kenneth B. Trousdell

Forester, North Coastal Plain Branch (Franklin, Va.), Southeastern Forest Experiment Station, Asheville, N. C.

If the size of each annual seed crop could be predicted, the management of loblolly pine would be greatly simplified. Where even-aged management systems are used and dependence is placed on natural reseeding, the normal variability in size of loblolly pine seed crops often leads to costly failures if harvest cuts and cultural measures are not properly timed. For example, if seed supplies fail or are inadequate for a year or two after a cut, hardwoods may capture the site or seedbed preparation measures may be wasted. Seed collectors can operate more efficiently if they can foresee bumper seed years when seed supplies may be built up cheaply. Thus, whether even-aged loblolly pine stands are to be established by natural seeding or planting, knowledge of future seed crops will permit better organization to accomplish either task.

A study was started in May 1948 on the Bigwoods Experimental Forest[1] to test the accuracy of a method for predicting the size of the seed crop 6 and 18 months in advance of its maturity. The method consists of counting the cones for last year's, this year's, and next year's crop on sample branches obtained from felled trees. The increase or decrease in number of cones counted measures the change in seed crop to be expected. It was assumed that a practicing forester would know the relative size of the previous seed crop with which the old cones were associated. If the initial sampling tests showed promise, it was recognized that corrections and refinements might be developed later. Accuracy of the trial forecast was checked against seed trap data for six stands. The cone ratio, expressed in percent, when applied to last year's seed catch would give an estimated total number of seeds to be expected 6 or 18 months hence.

Several studies have been made that correlate flower or ovulate bud formation with ultimate cone or seed production. J. Roeser, Jr.[2] working with Douglas-fir, which requires one growing season to produce mature cones, found that in 11 of 12 years the size of the flower crops indicated the size of the ultimate cone crop. In 6 of the 11 years the cone crop was slightly smaller than was indicated by the flower crop. Only in one year did a heavy flower crop yield a very light cone crop. For this species the percent of female flowers that develop into cones is high. Most of the mortality occurs during the early formative period of pollination and fertilization.

Roeser's data for ponderosa pine,[3] the cones of which require 26 months for development, showed that the largest flower crops yielded the largest cone crops, and the smallest flower crops yielded cone crop failures. He states that large flower crops are the rule rather than the exception with ponderosa pine and that ultimate cone crops, excluding crop failures, cannot be predicted from the flower crop. Cone mortality was greatest in the first season, the number of flowers that developed to mature cones varying from 0 to 76 percent, with 28 percent as the weighted average.

Allen,[4] working with Douglas-fir in Canada, suggests a method of seed crop forecasting based upon counts of ovulate and vegetative buds on sample branches. A count of buds is possible in the fall and permits one-year forecast of cone crops. The ratio of ovulate buds to vegetative buds, called "cone intensity," is expressed in decimals. This cone intensity ratio indicates the maximum limits of cone crops and must be corrected for all losses. Allen suggested that a cone intensity ratio might work with numerous western softwoods.

Seeding Characteristics of Loblolly Pine

There are three seeding characteristics of loblolly pine that justify an attempt to develop a technique for forecasting the size of future seed crops. First, two growing seasons are required to produce mature cones. Second, the productivity of any tree or stand as measured in sound seed varies tremendously from year to year. And finally, collections from seed traps in the Bigwoods Experimental Forest indicate that each forest stand has a relative seed-producing capacity which it maintains in relation to other adjacent stands.

The length of time required for cones to mature allows ample time to observe them during their development. They can be counted at any time during that period, and their numbers provide an estimate of the amount of seed which will be produced when they mature. The wide variation in the number of seeds produced from year to year means that any predicting mechanism need not be exceedingly precise to be usable. Jemison and Korstian[5] state that the quantity of sound loblolly pine produced in an average good year equals that produced in 10 poor years or 4 medium years. The sound seed produced by one stand in the Bigwoods Experimental Forest in a good year was 28 times greater than the sound seed produced by the same stand in a poor year. In view of the wide range shown by these records, it is logical to assume that variations in cone counts will reflect in some measure the variations in seed crops. It is

[1]Maintained in cooperation with the Camp Manufacturing Company, Inc. of Franklin, Va.

[2]Roeser, J., Jr. The influence of climate on seed production in Douglas-fir. Jour. Forestry. 40: 304-307, 1942.

[3]Roeser, J., Jr. Some aspects of flower and cone production in ponderosa pine. Jour. Forestry. 39: 534-536, 1941.

[4]Allen, G. S. A basis for forecasting seed crop of some coniferous trees. Jour. Forestry. 39: 1014-1016, 1941.

[5]Jemison, G. M. and C. F. Korstian. Loblolly pine seed production and dispersal. Jour. Forestry. 44: 734-741, 1944.

equally probable that small errors in the estimate will be unimportant because of the gross differences in yearly seed production.

Perhaps the most important characteristic of loblolly seed production affecting a forecast is that adjacent stands apparently maintain a fairly constant relationship in the amount of seed they produce. If this is true, a prediction based on samples from one stand will apply as well to others in the same neighborhood. Records given in Table 1 from four stands in the Bigwoods support this working hypothesis. As shown, an inferior seed year for one stand was an inferior seed year for the others. Also, the percent decrease from the first (better) year to the second (poorer) year was roughly the same in all four stands.

The mature loblolly pine stands listed in Table 1 had not been disturbed by logging for over 25 years except for stand 1. This stand was partially cut in the early summer of 1947, and cones already formed on the trees left at the time of cutting have furnished the 2-year seeding that has been measured. Stands 3 and 4 are forest grown, and 1 and 2 are old-field stands 95 years of age.

Prediction of the size of future seed crops would be much simpler if all the immature cones on a tree developed to maturity. However, this is far from true. The formation of a mature loblolly pine cone requires 24 to 26 months in 3 calendar years and spans 2 full growing seasons. Throughout this long period, from female bud formation to final viable seed, many factors are at work which increase or decrease the ultimate quality and quantity of seed. Any attempt to fix quantitative losses for the whole period is almost certain to fail. At some time during the cycle, nutrition, environment, age, weather, insects, animals, and possibly diseases have a direct bearing on the development from buds to useful mature seed. Table 2 shows the factors that may be critical in retarding development during each period. The losses due to animals and insects following maturity in October of the third year are included only to illustrate that losses are continually mounting until the sound seed fall from the open cone.

TABLE 1.—PINE SEED PRODUCTION COMPARED BY STANDS AND YEARS

Stand	Number of seed per acre, 1947-48		Number of seed per acre, 1948-49		Change in amount of seed from previous year	
	Total	Sound	Total	Sound	Total	Sound
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Percent*	*Percent*
1	366	264	50	9	−86	−97
2	852	639	142	46	−83	−93
3	601	427	103	27	−83	−94
4	341	236	50	12	−85	−95

TABLE 2.—APPROXIMATE REPRODUCTION CYCLE FOR LOBLOLLY PINE, HERTFORD COUNTY, N. C.

Year and season	Cone development	Estimate of normal damage	Factors influencing seed development
First year			
September	Ovulate buds	None	Nutrition, environment
March	Flowers	Slight	Frost (Weather)
April	Pollination	Heavy	Prolonged rain (Weather)
May to October	Early growth	Heavy	Insects
Second year			
October to March	Dormant	Very light	Insects
April to May	Fertilization	Light	Failure to fertilize, insects
May to October	Rapid growth	Light	Insects
Third year			
October to May	Seed from mature cones	Light	Animals, insects

The most critical period is from pollination through the first growing season. Roeser[3] found that mortality of ponderosa pine cones is greatest in the first year. Counts of cones and conelets on loblolly pine indicate heavy losses with this species between pollination and fertilization (a period of 12 or 13 months). It is believed that most of these losses occur during the first growing season and not during the dormant season. Following fertilization at the beginning of the second growing season, cones are firmly fixed, growth is very rapid, and losses appear to be limited to insect and animal damage.

Methods and Results

The earliest forecast that will consistently predict major changes in future seeding is the most useful. It was initially decided to make the forecast based upon cone counts in May. At this time last year's cones have completed their cycle but are still on the tree, next year's cones are about one inch long and have suffered most of the reduction in their numbers, and newly pollinated conelets are beginning their first growing season.

It was assumed that both dominant and codominant trees shared in the seed production of a stand and that cones were produced in the tops rather than on the sides of forest trees. The sample collected from each tree selected for study was the top 3-foot section measured down the main stem and included all branches and new twigs that remained intact after felling. In case the newly formed twig was broken off, the corresponding last year's growth was not considered in the counting.

During the third week in May the tops have three generations of conelets or cones in place; the position of any missing cones can be easily identified. The new conelets are at the top of the new shoot growth, the one-year cones are within last year's needle growth and last year's cones are below the needle growth (Fig. 1).

Three types of cones were recognized: sound, defective, or missing. Defective cones included those completely destroyed as well as those partially weevilled. Missing cones, although not separated as to cause at the time of the first forecast, were of three general types.

1. Torn from twig in felling—might be sound or defective.

2. Undeveloped stub showing

that the cone was partially developed and fell from the twig—a defective cone.

3. Chewed off by squirrels, leaving a well developed, fibrous stalk—a sound last year's cone.

Cone counts on samples from 24 dominant and 27 codominant trees indicated a smaller seed crop in 1948-49 than in 1947-48 (Table 3). When 1948-49 is compared to 1947-48, thirty-eight samples contained fewer cones, five contained the same, and eight contained a larger number of cones.

It was obvious that the 1948-49 seed crop would be poorer than the 1947-48 crop for this particular stand. A ratio of total cones (89/323) would indicate a 1948-49 seed crop of 27.5 percent of the preceding year. Because defective cones add little if anything to the seedfall, a ratio of sound plus missing cones (60/303) is considered preferable. This ratio indicated that the 1948-49 seed crop would be 19.8 percent of the 1947-48 crop. Instead of the estimated 19.8 percent of 1947-48, the four stands, trapped through identical periods, showed 13.7 percent, 14.6 percent, 17.1 percent, and 17.1 percent, of the 1947-48 total seedfall (Table 4). It would seem that this is a close enough estimate to serve as a useful tool for practicing foresters. The air-line distance between extremes of the four stands was approximately 1.7 miles.

The relative total seedfall, which was the original basis for the estimate, gives an estimate of all seed produced and does not attempt to estimate number of useful sound seed available. The proportion of sound seed to total seed changes markedly with the relative size of the seed crop. The more seed produced, the greater the percent sound. This change in the percent of sound seed was very large and quite consistent for the seed crops measured. In this case a poor year followed a good year. In three stands out of four, the percent sound dropped 45 percent and in the fourth 53 percent. The yield in sound seed from the four stands for the poor year 1948-49 is 3.5, 5.1, 6.2, and 7.2 percent of the good year 1947-48.

FIG. 1.—Pine top as it appears in May, showing cones in three stages of development: mature cones that ripened last year; immature cones that will ripen this year; and immature conelets that will ripen next year.

TABLE 3.—CONES AND CONE POSITIONS FOUND ON 51 SAMPLES

Year cones mature	Sound	Missing	Defective	Total all cones	Total sound plus missing cones
	Number of cones or cone positions				
1947-48	202	101	20	323	303
1948-49	52	8	29	89	60

Stimulation Caused by Release

Foresters have debated the influence of release cutting on seed production. There was an opportunity to measure this on two additional stands in the vicinity of stands 1 to 4. The first 6-month forecast failed completely for these two stands, designated 5 and 6, which were cut by the alternate-strip method in the winter and spring of 1946. The change in seed production between 1947-48 and 1948-49 was uniform for these two stands but did not follow the trend of the four uncut stands. Measured seedfall in stands 5 and 6 indicated a tremendous increase in conelet formation after one growing season following release. Seed from the resulting cones was not available until the third seeding year following cutting. When the surge in seed production came, during the 1948-49 seed year, it is interesting to note that it occurred in what was generally a poor seed year in the adjacent forest. If stands 5 and 6 had followed the trend in the adjacent forest and produced from 3.5 to 7.2 percent of sound seed produced in 1947-48, their yield would have been 3,400 to 7,000 sound seed per acre. Actually, stand 5 produced 80,000 and stand 6 produced 82,000 sound seed per acre. Measured in sound seed, the actual seed crop was more than 10 times that expected (Table 5).

Apparently the complete release of these mature stands prior to the growing season of 1946 resulted in the formation of conelets in the early spring of 1947; the conelets in turn produced a large crop, counter to the general pattern of seed production. If this surge in seed production is consistent for the species in time and amount, investments for hardwood control and seedbed preparation can be better planned than is now possible.

Conclusion

This study provides abundant evidence that a prediction of cone crop failures and bumper crops for a forest stand can be made 6 months in advance, based on a sound plus missing-cone ratio. The magnitude of any change in total

seed production as estimated by a seed as total seed production falls, cone ratio will overestimate sound and underestimate sound seed as total production rises. The reason is that the bigger the crop, the larger the percent of sound seed; the smaller the crop, the lower the percent of sound seed.

In forest stands the initial forecast in May 1948 checked fairly well with total seed production in the fall. A correction for percent sound, dependent on the size of the crop, will improve the usefulness of the estimate. There was some indication that defective cones should not be included in the cone ratio. There was abundant evidence that forecasts must be made separately for partially cut and uncut stands. On the whole, in spite of these needed modifications and qualifications, the forecast for a 6-month period holds much promise.

In contrast, the forecast 18 months before seedfall appears to span a period during which losses may be so heavy that accurate prediction is impossible. No check has yet been made of the actual yield of seed from the conelets observed in May of 1948, but all indications point to a crop far below that anticipated. The factors responsible for losses have not been isolated.

The study shows that release stimulates seed production in residual trees the third year after the cutting. The size of the next two seed crops following release can be estimated from samples taken in uncut stands. Thereafter, the timber from which samples are taken must have a cutting history similar to that of stands for which a forecast is made. Otherwise the forecast may be very inaccurate.

To be most useful a seed forecast should be available one year in advance. In September or October the cones about to shed seed are within the needles and have not been subject to heavy squirrel damage. The next year's cones are also within the needles and have survived one summer without damage by insects. A less accurate estimate one year in advance of seedfall will probably be more useful to practicing foresters than one made only 6 months in advance. A forecast one year in advance of seedfall will be included in the study as further observations are made.

TABLE 4.—ACTUAL SEED PRODUCTION OF FOUR STANDS COMPARED WITH PREDICTION MADE SIX MONTHS IN ADVANCE OF SEEDFALL

Stand	Seed production			1948-49 production in percent of 1947-48		
	1947-48	1948-49		Total seed		Sound
	Actual	Actual	Forecast	Actual	Forecast	Actual
	Thousands	*Thousands*	*Thousands*	*Percent*	*Percent*	*Percent*
1	366	50	72	13.7	19.8	3.5
2	832	142	165	14.6	19.8	5.1
3	601	103	119	17.1	19.8	6.2
4	341	50	68	17.1	19.8	7.2

TABLE 5.—TOTAL AND SOUND PINE SEED PER ACRE PRODUCED BY STANDS RELEASED IN 1946

Stand	Thousands of seed 1946-47		Thousands of seed 1947-48		Thousands of seed 1948-49	
	Total	Sound	Total	Sound	Total	Sound
5	120	79	134	98	147	89
6	124	92	147	99	156	82

Plant Loblolly Pines From Local Seed

Loblolly pine plantations at Bogalusa, La., show clearly the benefits of using seed from local sources, at least for loblolly pine. In 22 years, trees from seed secured locally (Livingston Parish, 50 miles from Bogalusa) produced 41.8 cords of merchantable pulpwood per acre. Those from Montgomery County, Texas, seed produced 22.7 cords; those from seed from Clarke County, Georgia, and Howard County, Arkansas, 17.7 and 15.4 cords respectively.

The climate at the Texas seed source is similar to that at Bogalusa, but drier. The Arkansas and Georgia seed sources have lower average temperatures and shorter growing seasons than Bogalusa. The seed from all four sources was shipped to Bogalusa in the cone, extracted, and sowed in a nursery there. In the winter of 1926-27, the 1-year-old seedlings were planted at 6- by 8-foot spacing.

In the winter of 1948-49, trees from the Louisiana seed averaged 46 feet in height and 6.7 inches in d.b.h. Those from Texas seed ran second best—41 feet high and 5.2 inches d.b.h. Trees from Georgia seed averaged 38 feet high and 5.2 inches in d.b.h. Those from Arkansas seed were 36 feet high and 4.7 inches d.b.h.

Survival was 82 to 84 percent for all except Georgia stock, which averaged 77 percent. The Georgia stock proved very susceptible to southern fusiform rust; 37 percent had stem cankers. Only 4 to 6 percent of the trees from other seed sources had such cankers.

P. C. WAKELEY,
Southern Forest Experiment Sta., New Orleans, La.

Growth of Ponderosa Pine[1]

Phillip A. Briegleb

Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

THE GROWTH CHARACTERISTICS of ponderosa pine have probably been studied more intensively than have those of any other tree species in America—perhaps in the world. What other species, for example, can boast a full half-dozen different tree classification systems? A list of the authors who have contributed to the literature of the subject includes scores of foresters, entomologists, plant physiologists, botanists, biometrists, and forest economists. Among them are many Fellows of the Society of American Foresters.

Resulting from this great activity are dozens of publications from which the pine manager may choose for guidance in the preparation of a growth estimate or a marking rule. But in spite of this prodigious effort the information is seldom as specific as it ought to be, and few generalizations can be made about the growth of ponderosa pine without fear of successful contradiction. This situation is caused entirely by the complexity of the pine stands themselves and by their wide variability rather than to any shortcomings on the part of the investigators.

In fact, it would be strange indeed if ponderosa pine were not highly variable. Its range extends from the Great Plains to the western coast mountains and from Mexico north into British Columbia. The ponderosa type covers more than 50 million acres over which average annual precipitation varies from less than 15 inches on the borders between desert and forest to more than 50 inches in moister parts of the range. Variations in seasonal distribution of rainfall and in temperature are likewise tremendous. Thus, it follows that the safest generalization about pine growth is that generalities do not apply. For example, the species occurs most commonly in unevenaged stands but on some sites also grows exceptionally well in even-aged stands (*8*). Over much of its range prevailing growth rates are rather low, but on the most favorable sites increment exceeds that of the fast-growing southern pines.

Rates of gross growth in pine sawtimber have been estimated to range from about 20 board feet to 2,000 board feet per acre per year. Mortality is erratic and hence net growth is even more variable than gross growth. Annual change in stand volume may range from a net loss of more than 1,000 board feet per acre to a net gain of about 2,000 board feet. Assuming that there were an "average" stand, today's "typical" pine sawtimber would be making a modest gross increment of about 100 board feet per acre per year, more than half of which would be lost by mortality.

Prevailing growth contrasts sharply with potential growth rates in ponderosa pine (*1*). If the forest manager is to encourage progress in the direction of the potential he needs to understand the causes of the wide differences in pine growth. It will pay us all to take stock of the tree, stand, and site characteristics that have been found, or are suspected, to be related to pine growth.

Age

Many measurements have been collected in the several pine subregions showing that, other things being equal, young trees grow more rapidly than older trees. This does not mean that all young pine trees are growing rapidly. Many are growing slowly, owing to overdense stocking in reproduction and pole stands—a condition which challenges pine researchers and administrators alike.

Growth of stands as well as that of the individual tree is related to age. As shown by the normal yield tables (*8*) mean annual sawtimber growth in full-stocked, even-aged, natural stands on average sites culminates at about 140 years. On the best sites indicated rotation is about 100 years, on the poorest about 200. Under management the most efficient rotation may be greater or less than the ages cited above, depending on the practices applied.

Crown Vigor

Trees with good or full crown vigor have been found to grow more rapidly than those with fair or poor vigor.

The two tree characteristics of age and crown vigor form the basis of the Dunning (*3*) and the Keen (*4*) tree classifications. In natural stands on average sites the recognized variations in age and vigor account for a wide range in tree diameter growth; from about $\frac{1}{4}$ inch per decade for the least vigorous of the oldest trees to more than $1\frac{1}{2}$ inches per decade for the most vigorous of the young trees. Within the same age class the most vigorous trees may grow 300 percent more rapidly than those of poorest vigor.

Keen and others have pointed out that the growth rate of a tree is related to its current degree of health. Thus, a young tree with a full crown, if infected by disease or infested with insects, will grow at a slower rate than the average for normal trees of corresponding age and crown class. The Salman-Bongberg (*11*) risk rating for ponderosa pine and the Keen penalty rating system attempt to relate visible tree characteristics to current health. The characteristics recognized in these ratings have been found to be strongly related to mortality probability and to growth rate for periods as long as a decade. When significance of the rating is expressed quantitatively estimates of pine growth and mortality should be greatly improved.

Tree Size

Several studies have shown that, on the average, a given volume of growing stock in small trees will produce a greater increment than will a like volume in fewer but larger trees. As Lexen (*5*) points out this is probably due to the greater growing or bole surface in a given volume of small trees. Also, on the average, the smaller trees are usually younger than the larger. But, as every good timber

[1]Presented at a meeting of the Division of Silviculture, Society of American Foresters, Seattle, Wash., Oct. 12, 1949.

marker knows, the exceptions to this rule are so frequent that cutting to a rigid diameter limit has long been recognized as poor practice in ponderosa. Young trees of good vigor are frequently larger than much older slower-growing trees of poor vigor.

Site Quality

There is an extremely wide range in the relative productive capacity of ponderosa pine lands. Capacity of the most productive sites in comparison to the poorest is in the ratio of 8 to 1 in terms of cubic feet of wood and 26 to 1 by board measure (8). There is some indication that the conventional height-age index of site does not always measure growth capacity of pine lands accurately. For example, on Site V lands height growth of comparable trees is about the same regardless of locality. But in the Southwest trees on Site V lands appear to grow somewhat faster in diameter and hence in volume than do similar trees in Oregon and Washington. This relationship may be caused by differences in temperature, seasonal distribution of rainfall, differences in soils, strain of growing stock, or by a combination of factors.

Precipitation Cycles

Wide periodic variations in rainfall and corresponding variations in tree growth are characteristic of the ponderosa pine type. The growth that is actually laid on during any specific decade or two may surpass or fall short of the long-time average increment by a wide margin, perhaps as much as forty percent, depending on whether rainfall excess or deficiency occurs. Over longer periods these wide discrepancies tend to compensate, and since the length or intensity of a good or poor growth cycle cannot be predicted with accuracy, the best estimate of growth that can be made for any future period is the long-time average rate.

The effect of precipitation cycles on growth is not simple. Trees of low vigor tend to suffer a greater relative reduction in growth during unfavorable periods than do the more vigorous trees. Among the low-vigor trees the greater reduction occurs in the younger ages, but among the trees having good crown vigor the older age classes experience the greater relative decline in growth. Variations in increment due to precipitation cycles are more pronounced on poor sites than on the good (2).

Strain of Stock

Within the past few decades foresters have become increasingly aware that the rate of growth that occurs on a given site may vary widely, depending upon the genetic characteristics of the growing stock (6). Occurring over a wide territory, ponderosa pine has great variations in form, life, and growth habits. For example, in 6 test plantations of 10 different races of ponderosa pine stock, representing strains from throughout the range of the species, Munger found that the fastest outstripped the slowest growing by about 60 percent (9). At the Institute of Forest Genetics in California hybrids of pines are being developed that are exceptionally fast growing. These instances illustrate some of the improvements in growth that may result from maintaining the best strain of growing stock on each site. The possibilities are impressive but the detailed job of finding or developing the best strains will require a vastly greater effort than is now being made.

Stand Competition

Growth of an individual tree is influenced markedly by the number, size, proximity, and competitive ability of its neighbors. It has been found, for example, that the growth of a ponderosa pine tree is smaller the heavier the timber stand in which it is situated. Growth does not decrease at a uniform rate, however, for each additional unit of volume. Up to about 2,000 board feet per acre on average sites the reduction is slight, indicating that trees in such light stands usually do not benefit much from additional space. In heavier stands, the reduction in growth per tree for each added unit of volume becomes substantial, but the effect of each added unit is less than that of the previous one. Beyond about 14,000 board feet per acre, the influence of additional volume on growth per tree is compartively small.

Growth records have shown that a given volume in the reserve stand does not represent uniform stand competition conditions. For example, the trees in a 5,000 board feet per acre stand reserved from a 25,000 original are expected to grow 63 percent more rapidly than the normal rate for the tree classes represented. However, a 5,000-foot reserve from an original of 7,000 board feet is expected to grow only 25 percent more rapidly than normal. In the first case the residual stand was released by removal of 20,000 board feet, in the second by removal of only 2,000. In such stands as the second, average spacing is poorer than in such stands as the first (2).

Response to release of different tree classes varies widely. Furthermore, how the response is related to degree of release is not known in the detail that timber markers need. In general the response is most pronounced among the younger age classes which have experienced substantial suppression and least among the overmature veterans that have been comparatively free-growing for long periods (7).

There are indications that the amount of shrub cover and understory of poles, saplings, and seedlings may considerably affect the growth and mortality rates of the larger pine trees through competition for soil moisture. Accurate quantitative measure of this relationship is urgently needed by foresters planning sequence of cuttings and preparing marking rules.

Volume of Growing Stock

Pine managers are faced with practical questions about their growing stock every day. What timber volume should be maintained to obtain maximum growth? What should be the distribution by size and age classes? Even-aged ponderosa stands produce prodigious yields in some places. Will even-aged management produce greater growth in the long run than uneven-aged culture, and, if so, on what sites? What species composi-

tion will produce greatest increment on the various pine sites? How should it be attained and maintained? At what rate should the transition from existing to desired growing stock be made in order to maximize growth and insure a reasonably uniform flow of products from the forest? What should be the level of stocking in the presently stagnating regeneration and pole stands (*12*) and how can it be obtained?

The best reply to most of these questions at present is a crude approximation or guess. Tremendous study effort will be required to supply the specific answers needed, and those answers will undoubtedly vary site by site and stand by stand. A few guide posts are available to point out the direction in which some of the answers may lie. For example, the light cutting experiments in pine during recent decades indicate that, for many stand structures, a heavier volume of growing stock may well be carried than was previously thought advisable.

At Pringle Falls in central Oregon maximum growth on average sites during the first 10 years after the initial harvest cut resulted from growing stocks of from 12,000 to 16,000 board feet per acre. At Black's Mountain in northern California a net growth of 134 board feet per acre per year resulted from similarly heavy growing stocks left following light, sanitation-salvage cutting. In contrast, a growth of only 48 board feet per acre per year followed the very heavy cutting. In western Montana, Roe (*10*) found that a reserve stand of 9,098 board feet yielded an annual net increment of 126 board feet per acre per year during the first 35 years after logging. But reserves of 4,655 board feet yielded 96 feet in increment, and 2,396 board feet of growing stock produced only 37 board feet of annual growth. Results from sample plots on the Rogue River National Forest in Oregon followed a similar pattern. Reserve stands of 10,000 to 14,000 board feet per acre produced net annual increments of about 165 board feet per acre; a reserve of 5,000 board feet per acre produced 120 board feet per acre per year.

It would be short sighted indeed to propose light cuttings and heavy reserves uniformly for all the variations in site and stand condition. However, the new information is proving of help to pine foresters. It shows that relatively high growth rates may be obtained with quite heavy reserve volumes of mature and overmature timber if trees of the highest mortality risk and lowest growth rate are removed in light cuts. Such practices will be especially helpful in spreading the harvest of a predominantly overmature forest over the period required to fill deficient small sawtimber size classes by stimulating the growth of existing poles and of reproduction. Clearly it is not necessary to liquidate all old-growth and complete the transition to second-growth to obtain a substantial net increment in ponderosa pine.

In the managed forest it is quite likely that maximum or near maximum volume growth may be obtained by quite a wide range in levels of growing stock volume. But the quality and the value of wood grown in light stands will likely be much lower than that from a more substantial reserve. Thus, decisions on volume of growing stock to maintain should be based in part on considerations of wood quality. Another advantage in carrying a relatively heavy volume of growing stock lies in the flexibility it gives the forest manager. It gives him the opportunity to increase the cut temporarily to take advantage of periods of good markets without undue sacrifice of future productivity. This cannot be done without serious impairment of future yields if growing stocks are constantly kept at the minimum required to yield potential or near potential growth. On many areas coordinate uses such as forage or water production or recreation may need to be considered in determining growing stock levels.

Skill in Management

The pine forester has greater opportunity to apply flexible management methods than may be possible in many other forests. This stems from the wide variations in growth rate and other tree characteristics found in typical ponderosa stands plus the general applicability of tree selection and small-area cutting. By continually removing the poorest trees, tree class by tree class, and reserving the best, the skillful forester should raise the vigor level of a given class of tree in a managed stand substantially above that of a like class in the natural stand. In addition to improving growth, this kind of management should also reduce the risk of catastrophic insect and other losses. In terms of a pine rotation such practices are barely well started in ponderosa. What their precise effect on increment may be the mensurationist is at a loss to evaluate. But if knowledge of management is continually increased and applied with skill it is more than likely that time will prove today's growth predictions are well below the levels of productivity that actually will be attained.

Well then, where do we stand? Research has developed some useful guides for improving everyday forest practices, but even so the best that can now be done in predicting growth of individual trees is rather crude. The standard errors of estimate range from 20 to 70 percent of the actual. To provide the basis for continued improvement in cutting practices much more of what we now call random variation in growth must be explained, effect and cause must be more closely related. The skills required to complete the management job cannot be developed without a strong background of fundamental knowledge of soils, ecology, plant physiology, forest entomology, pathology, silvics, biometry, timber utilization and economics. This is the foundation which we must build before we can bring our pine forests to potential productivity capable of maintaining a maximum flow of products, a profitable industry, and a strong and prosperous population.

Literature Cited

1. BARTELDS, P. A. 1940. Forest growth in the ponderosa pine region of Oregon and Washington. Pacific North-

west Forest and Range Expt. Sta. Forest Survey Report 78. 51 pp. (Processed)
2. ———. 1945. Calculating the growth of ponderosa pine forests. U. S. Forest Serv., Portland, Oreg., 60 pp. (Processed)
3. DUNNING, DUNCAN. 1928. A tree classification for the selection forests of the Sierra Nevada. Jour. Agric. Research 36:755-771.
4. KEEN, F. P. 1943. Ponderosa pine tree classes redefined. Jour. Forestry 41 (4):249-253.
5. LEXEN, BERT. 1939. Growth following partial cutting in ponderosa pine. Jour. Forestry 37 (12):943-946.
6. LINDQUIST, BERTIL. 1948. Genetics in Swedish forestry practice. Chronica Botanica Co., Waltham, Mass., 173 pp.
7. MEYER, W. H. 1934. Growth in selectively cut ponderosa pine forests of the Pacific Northwest. U. S. Dept. Agric. Tech. Bul. 407. 64 pp.
8. ———. 1938. Yield of even-aged stands of ponderosa pine. U. S. Dept. Agric. Tech. Bul. 630. 60 pp.
9. MUNGER, T. T. 1947. Growth of ten regional races of ponderosa pine in six plantations. Pacific Northwest Forest Expt. Sta. Forest Research Notes no. 39. 4 pp. (Processed)
10. ROE, A. L. 1947. The growth rate of selectively cut ponderosa pine in western Montana. Northern Rocky Mountain Forest and Range Expt. Sta. Research Note no. 55. 4 pp. (Mimeo.)
11. SALMAN, K. A. and J. W. BONGBERG. 1942. Logging high risk trees to control insects in the pine stands of northeastern California. Jour. Forestry 40 (7):533-539.
12. WEAVER, HAROLD. 1947. Management problems in the ponderosa pine region. Northwest Science 21 (4): 160-165.

The Effect of Repeated Pruning on Diameter and Height Growth of Planted Slash Pine

William R. Boggess

Associate professor[1] of forest research, Dixon Springs Experiment Station, University of Illinois.

ANY DRASTIC REDUCTION in the leaf surface of a tree will cause reduced growth. In forest stands reduced leaf surface may result from defoliation by fire, insects, disease, or pruning by man; defoliation from some of these causes may recur from year to year. A study was undertaken to determine the effect of repeated reductions of leaf surface on the diameter and height growth of a young slash pine plantation. Reduction in leaf surface was accomplished by pruning to specified heights.

Method of Study

The study was started in the winter of 1940-1941 at the Barbour County forest unit of the Alabama Agricultural Experiment Station. The slash pine plantation had been established in 1934-1935 on an eroded slope, which had been abandoned as crop land. Survival of the pine was about 60 percent in 1940.

Four treatments were used: (1) no pruning; (2) pruning to $\frac{1}{4}$ the tree height; (3) pruning to $\frac{1}{2}$ the tree height; and (4) pruning to $\frac{3}{4}$ the tree height. The $\frac{1}{4}$-pruning treatment seldom removed more than one living branch whorl; only one or two living whorls were left on the $\frac{3}{4}$ pruned trees.

The treatments were assigned to $\frac{1}{2}$-acre plots in a randomized block design. Each treatment was replicated three times. All trees on a given plot were pruned, and d.b.h. and height measurements were made on 25 randomly selected trees. Thus, for any given treatment the yearly average for d.b.h. or height is based on the measurement of 75 trees.

The trees were pruned during the winter of 1940-1941 and at two-year intervals thereafter. Measurements were made prior to pruning and at the end of each growing season with the exception of 1944. The results reported here cover six complete growing seasons.

Results

The average diameter (d.b.h.) and height of trees in each treatment for the years 1940-1946 inclusive are shown in Table 1.

Straight lines have been fitted to the observational data given in Table 1 by the method of least squares.[2] The trends for diameters are shown in Fig. 1 and for heights in Fig. 2. The straight line proved to be a good fit for these data.

Diameter Growth

Diameter growth has been reduced by all three pruning treatments. In the beginning the unpruned trees were smaller than those assigned to the pruning treatments. After one growing season the unpruned trees were as large as those which had been $\frac{3}{4}$ pruned; after two growing seasons they were slightly larger than the $\frac{1}{2}$-pruned trees, and after five years they were as large as the $\frac{1}{4}$-pruned trees.

The yearly rate of diameter increase, as shown by a comparison of the regression coefficients[3] is sig-

TABLE 1.—DIAMETER (D.B.H.) AND HEIGHT OF SLASH PINE PLANTED IN 1934-1935 AND PRUNED TO VARIOUS HEIGHTS AT TWO YEAR INTERVALS SINCE 1941

Year	Treatments			
	No pruning	$\frac{1}{4}$ pruned	$\frac{1}{2}$ pruned	$\frac{3}{4}$ pruned
	D.B.H. (in inches)			
1940	1.22	1.53	1.44	1.45
1941	1.97	2.18	2.04	1.98
1942	2.72	3.00	2.67	2.60
1943	3.38	3.53	3.23	3.09
1945	4.46	4.47	3.96	3.69
1946	5.03	5.09	4.40	4.07
	Height (in feet)			
1940	7.9	8.9	8.5	8.7
1941	10.4	11.7	11.1	11.0
1942	13.5	14.7	13.9	13.4
1943	16.8	18.3	16.7	16.2
1945	22.6	23.5	21.4	20.5
1946	27.2	28.3	25.6	24.5

[1]Formerly associate forester, Alabama Agricultural Experiment Station, Auburn, Ala.

[2]From the type equation $Y = \bar{y} + b(x - \bar{x})$ where Y is the value to be calculated for the dependent variables (height and diameter) for each value of the independent variable x (years). $\bar{y}$ and $\bar{x}$ are the means of all values for the dependent and independent variables, respectively, and b is the regression coefficient.

nificantly less for the $^3/_4$- and $^1/_2$-pruned trees than both the unpruned and the $^1/_4$-pruning treatments.[4]

Height Growth

Height growth has been reduced by the $^1/_2$- and $^3/_4$-pruning treatments. As with diameter the unpruned trees were smaller than those assigned to the other treatments. After two growing seasons the unpruned trees were as tall as those which had been $^3/_4$ pruned, and after three growing seasons they were as large as the $^1/_2$-pruned trees. The $^1/_4$-pruned trees were the tallest in the beginning and have maintained about the same annual height increase as the unpruned trees.

The yearly rate of height increase[5], calculated as in the case of diameters, is significantly less[6] for the $^1/_2$ and $^3/_4$-pruning treatments than either the unpruned or $^1/_4$-pruned trees.

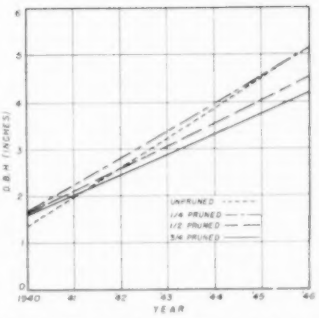


FIG. 1.—Trends showing the annual increase in diameter of slash pine planted in 1935 and pruned at two year intervals to various heights.

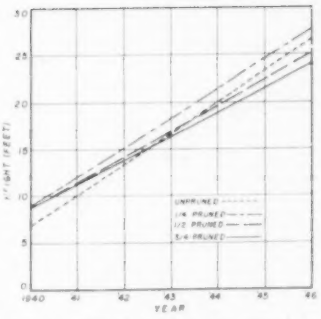


FIG. 2.—Trends showing the annual increase in height of slash pine planted in 1935 and pruned at two year intervals to various heights.

[3]The regression equations for the yearly increase in d.b.h. for each treatment are:
(1) no pruning: $Y = 3.1300 + .6266\ (x - 3.833)$
(2) $^1/_4$ pruning: $Y = 3.2850 + .5694\ (x - 3.833)$
(3) $^1/_2$ pruning: $Y = 2.9567 + .4847\ (x - 3.833)$
(4) $^3/_4$ pruning: $Y = 2.8133 + .4283\ (x - 3.833)$

[4]Significant at the 1 percent level.

[5]The regression equations for the yearly increase in height for each treatment are:
(1) no pruning: $Y = 16.4000 + 3.1751\ (x - 3.833)$
(2) $^1/_4$ pruning: $Y = 17.5666 + 3.1552\ (x - 3.833)$
(3) $^1/_2$ pruning: $Y = 16.2000 + 2.7651\ (x - 3.833)$
(4) $^3/_4$ pruning: $Y = 15.7166 + 2.5608\ (x - 3.833)$

[6]Statistically significant at the 1 percent level.

Churches Pioneer in Forestry

At least two church organizations in the United States are pioneering in forestry projects. The first one was begun in 1942 when the Presbyterian Church, U.S.A., bought 1,100 acres of woodland on the western edge of the Cumberland Plateau near Alpine, Overton County, Tenn. Since the original purchase, 500 acres have been added. This beautiful mountain woods is called Alpine Forest Reserve and is under the direction of a forester, J. Edwin Carothers. One objective of the reserve is to demonstrate practical forest management. It also gives part time employment to several men, and seeks to develop the spiritual life of the workers. A farmers' forest cooperative, similar to the one at Cooperstown, N. Y., may grow out of the Reserve work.

The second religious organization to become interested in a forestry project was the Evangelical and Reformed Church. After much delay and hardship in raising funds, in 1949 this church purchased 4,080 acres of land in the Missouri Ozarks about 22 miles south of Salem, Mo., in Shannon County. This woodland has been named Shannondale Community Forest. The Rev. Vincent W. Bucher and a group of community people are beginning work together to make this a demonstration forest. Mr. Bucher and his helpers are building the spiritual and economic life of Shannondale Community.

J. EDWIN CAROTHERS,
Forester,
Alpine Forest Reserve,
Alpine, Tenn.

Harvest Cuttings in the Southern Piedmont Region[1]

D. J. Weddell

Dean, George Foster Peabody School of Forestry, University of Georgia, Athens.

THE PIEDMONT REGION, extending from southern New Jersey to a point approximately fifty miles inside the Alabama line, is an upland area, ranging in elevation from 500 to 2,000 feet. The region (*5*) is typically rolling to hilly and almost mountainous in some sections.

Excessive soil erosion occurs over the area unless definite precautions are taken. Because of past abuses the soils are quite generally poor and are low in organic matter; they range in texture from coarse sandy loams to clays. The Cecil soils predominate in the southern Piedmont. These soils are generally heavy in texture and yellowish to yellowish red in color. As the top soil erodes away, the red color predominates.

The timber types usually recognized in the Piedmont are shortleaf, loblolly, shortleaf-loblolly, shortleaf mixed hardwood, and loblolly-mixed hardwoods. The river bottoms are in mixed hardwoods.

Many foresters, as well as laymen, believe that the Piedmont region is a pine region and always was in pine timber. Oldtime records prove the opposite. William Byrd III, head of a surveying party in 1728, described the Piedmont area as follows, "The soil we passed over this day was generally good, being clothed with large trees of poplar, hickory, and oak" (*10*).

H. H. Bennett, in his recent book *Soil Conservation* (*2*), shows the change that has taken place. Bennett writes as follows, "The original forest growth was quite different from the forests of the present time. On the highlands, the oak, hickory and chestnut were of large size and stood far apart. There was no underbrush and the woods were carpeted with grass and the wild pea vine. Along the streams and in the valleys the distinctive growth was willow, beech, birch, black walnut, ash, poplar, and gum. . . . The original forest has disappeared almost entirely and has been replaced by scrubby oak, by underbrush, and by shortleaf pines on the abandoned fields."

Since this paper deals with the proper cutting methods to use in a definite region of the United States, it seems appropriate to define certain terms. There appears to be a considerable difference of opinion as to terminology followed in describing the various harvest cuttings. We read, for example, of "clearcutting with scattered seed trees," and various other phrases. Mattoon in U.S.D.A. Bulletin 308, *Shortleaf Pine, Its Economic Importance and Forest Management*, says that some form of clearcutting (for shortleaf) should be used and that one method leaves isolated seed trees scattered uniformly over the tract. W. D. Sterrett (*11*) in an earlier work states that one of the approved methods of managing the loblolly pine is to "clear cut except for scattered individuals or groups of loblolly pine trees."

W. G. Wahlenberg (*12*) in his recent and very worthwhile book *Longleaf Pine* speaks of "using clearcutting with seed trees."

Selective cutting also seemingly means a different thing to different people. E. T. Hawes (*6*), forester, U. S. Forest Service, Atlanta, in a recent speech classifies these people into three groups, as follows: the technical forester who thinks of the removal of the mature timber singly or in groups to get continuous reproduction; the layman and the nonpurist forester who thinks of the selecting of the trees to come out for many reasons, but not necessarily to expect reproduction; and the timber operator who thinks of the selecting of high-grade trees for cutting which are most desirable from his standpoint.

I think that it is time that foresters got together on the proper term to use in describing a definite type of forest practice. A set of standard definitions were established when the Society of American Foresters published the *Forestry Terminology* (*7*) in 1944. Inasmuch as this Society represents the majority of the professional foresters in this country, it would seem logical that the terminology included in this book be accepted as standard.

Following this line of reasoning and quoting from *Forestry Terminology*, by definition, "clearcutting" is the removal of the mature timber in one cut; "seed-tree cutting" is the removal of the mature timber in one cut except for a small number of seed trees left singly or in small groups; "shelterwood cutting" is the removal of the mature timber in a series of cuttings, which extend over a period of years . . .; and "selection cutting" is the removal of the mature timber, usually the largest and oldest, either as single scattered trees, or in small groups at relatively short intervals, repeated indefinitely.

Again, I urge foresters to use the terminology that actually fits the situation.

And now to return to the Piedmont region. Most of the region has been cleared for agriculture one or more times, and following the "turning out" of the land after it has been depleted by poor methods of farming, the land usually reverts to pine, pure pine in many instances. General observations and the statements of many people will show that at the present time there is an "invasion" or "reclaiming" of these pine stands by hardwoods, in many cases inferior hardwoods.

What brings about this change from pine to hardwoods? At least two factors are involved: the natural tendency for all stands to attain their climax composition as rapidly as possible (in the Piedmont this would be a mixed hardwood-pine complex); and the handling of these stands in a manner that has favored the hardwoods over the pines.

This problem of hardwood encroachment and the best cutting method to use in loblolly and shortleaf pine is not confined to the

[1]Presented at a meeting of the Division of Silviculture, Society of American Foresters, Seattle, Wash., October 12, 1949.

Piedmont region. In a personal letter, H. L. Person, officer in charge, East Texas Branch, Southern Forest Experiment Station, Nacogdoches, Texas, writes, "I believe the same principles (as in the Piedmont-Weddell) apply to many of the loblolly-hardwood and shortleaf-hardwood sites of East Texas. We now have a serious hardwood control problem on many areas where selective cutting and fire exclusion have favored the encroachment of hardwoods. I personally favor the use of the shelterwood. . . Selection cutting has become widely accepted largely by default. Those of us who believe in even-aged management for southern pines have the responsibility of selling this idea to foresters and timber owners. I look for a rapid change in the thinking of observing foresters within the next few years in this regard."

All this is preliminary to the problem of what harvest cutting method should be followed in cutting over the timber stands of the Piedmont. I doubt if there would be any disagreement as to the method to follow in the hardwood stands. The selection method would be recommended. When the stands to be cut over are pine, considerable discussion would probably arise.

Many well-intentioned people, and many of these are well trained foresters, believe that the panacea of all our forestry problems is to follow the selection method of cutting. From time to time we read or hear that any other method of practicing forestry is, to quote, "poor forestry." The U. S. Forest Service in its *Report 3 from A Reappraisal of the Forest Situation, the Management of Forest Lands in the United States* makes the following statement. "*Poor cutting* leaves the land with a limited means for natural reproduction often in the form of remnant seed trees on broad areas otherwise clear-cut of all merchantable timber." The author of Leaflet 153 (3) of the Forest Service, *How to Cut Southern Farm Timber for Steady Income*, says "cut timber lightly and frequently—selective cutting," with no qualifying statement whatsoever. One of the leading textbooks on silviculture suggests that the selection method appears "feasible" but in the revised edition to be issued this fall this recommendation will be changed.

The pine stands of the Piedmont are normally even aged and *should best* be handled as even-aged stands. This will necessitate the use of almost any method *except* the selection method.

One of the outstanding research projects carried out in the region on cutting methods was done by Barrett and Downs (*1*) of the Appalachian Forest Experiment Station (now the Southeastern Forest Experiment Station). In an article *Hardwood Invasion in Pine Forests of the Piedmont Plateau* they say, "For the common pine sites of the Piedmont region, this study indicates that the selective logging in pine sawtimber stands may promote the gradual replacement of the pine with hardwoods. . . . Because it is generally conceded that both shortleaf and loblolly pine seedlings develop more rapidly in full light than in shade, it becomes necessary to consider the possibility that some form of drastic treatment, such as clearcutting by the strip, group or seed-tree system, is more likely to maintain the high proportion of pine in future stands than is selection cutting. Clear-cutting brings about certain physical conditions that may reasonably be expected to favor maintenance of pine."

H. H. Chapman has, on numerous occasions, expressed himself as opposed to the selection method of cutting in the loblolly stands of the South. Quoting Chapman (*3*), "it is my belief that loblolly pine, managed under the single tree selection system will steadily lose ground to hardwoods of inferior grade until it may practically disappear from the stand." In the same article he further states that the seed-tree system is indicated.

At the annual meeting of the Society of American Foresters in 1947 held at Minneapolis, in a paper entitled *How to Grow Loblolly Pine Instead of Inferior Hardwoods* (*4*), Chapman made this very significant statement. "The selection system, in its goal and ideal, violates all the fundamental ecological relations between competing pine and hardwoods."

What has been done under controlled conditions to determine the better method to use in cutting? The Duke School of Forestry, for the past several years, has been carrying on an experiment in the Piedmont region in Georgia to try to determine the method of harvest cutting most suitable to the pines in the Piedmont. In answer to a direct question as to the results found so far in this experiment, Dean C. F. Korstian wrote me as follows, "The selection system is out as far as our results in the Piedmont show, except on very poor or sandy soils. Here the pines may have a chance until the hardwoods gradually take over."

The preponderance of evidence as to the best method for cutting the pine stands of the Piedmont seems to point to some method other than the selective method. What should the recommendation be? In general, the seed-tree method, leaving a minimum of six selected seed trees (I doubt if any evidence can be found to prove the exact number of seed trees per acre that will be most likely to bring about the desired conditions following cutting). Some localized conditions may warrant the use of the shelterwood method; and clearcutting, with planting, has a definite place under certain conditions.

In using any of these recognized methods, one very important point must be remembered, and followed. Money must be spent in order to bring along the next crop. Cleanings, to reduce the amount of hardwoods, will probably be necessary. Perhaps other cuttings to reduce still further the number of competing hardwoods may also be necessary. For too long a time many of us, or probably most of us, have thought and talked about growing and harvesting a crop of timber without any regard for the way the crop developed. This has been particularly true for the early period in the life of the stand.

Another very important factor that must be given considerable attention is the selection of the proper trees to be left for seed production. The first and most important point to consider is whether or not the selected trees are seed producers. A careful check should be made for evidence that the particular trees selected have produced seed in the past. This will indicate that they will produce seed in the future.

In conclusion, evidence supports the idea that the seed-tree method should, in general, be used in cutting over the pine stands of the Piedmont region. Careful attention must be given to the selection of the trees to leave as seed trees, and money must be spent on the area to bring along the next crop.

Literature Cited

1. BARRETT, L. I. and A. A. DOWNS. 1943. Hardwood invasion in pine forests of the Piedmont Plateau. Jour. Agric. Research 67: 111-128.
2. BENNETT, H. H. 1939. Soil conservation. McGraw-Hill Co. 993 pp.
3. CHAPMAN, H. H. 1944. Comments. Jour. Forestry. 42: 838.
4. CHAPMAN, H. H. 1947. How to grow loblolly pine instead of inferior hardwoods. Soc. Amer. Foresters Proc. p. 347.
5. GARRARD, J. A. 1939. Thesis. A study of the soil series of Georgia. Univ. of Ga. Library.
6. HAWES, E. T. 1949. Comments. Paper presented at Ga. Acad. Sci., Atlanta, Ga.
7. HAWLEY, R. C. *et al.* 1944. Forestry Terminology. Soc. Amer. Foresters 84 pp.
8. MATTOON, W. R. 1915. Shortleaf pine, its economic importance and forest management. U. S. Dept. Agric. Bul. 308.
9. MATTOON, W. R. 1938. How to cut southern farm timber for steady profit. U. S. Dept. Agric. Leaflet 153.
10. ROWALT, E. M. 1937. Soil defense in the Piedmont. U. S. Dept. Agric. Farmers Bul. 1767.
11. STERRETT, W. D. 1914. Forest management of loblolly pine in Delaware, Maryland, and Virginia. U. S. Dept. Agric. Bul. 11.
12. WAHLENBERG, W. G. 1946. Longleaf pine. Chas. L. Pack Forestry Foundation 406 pp.

A Proposal for Forestry Demonstration Areas Along Highways[1]

George R. Stewart
Professor of English, University of California, Berkeley.

The author of the popular book Fire *makes another contribution to the advancement of public understanding of forestry problems and forestry progress. Using a familar area of the State of California as an example, he develops a plan for utilizing what is happening in forestry. The proposal is just as adaptable to the author's native state of Pennsylvania as it is to his adopted area. In fact, it is worth the attention and action of foresters, both public and private, everywhere.*

FORESTRY, IN ITS PUBLIC RELATIONS, faces a two fold problem. On the one hand, like any other industry, it must try to influence the great inert mass of the general public, that normal vast majority of normal people who care nothing for anything not their own immediate pleasure or profit. On the other hand, forestry has its own special problem in combatting a curious kind of traditional hostility against the cutting down of trees, which exists among our more intelligent and altruistic people. These people we should expect to be the foremost supporters of intelligent forestry, but too often they are imbued with the romantic love of the primeval forest. Preservation, not utilization, is their catchword.

In the hope of influencing both these groups of people, I wish to make a very specific proposal.

As you drive along our highways, you will see many billboards. If one of them sticks up blatantly against a mountain peak or a waterfall, you will be irritated, as any good citizen and lover of the outdoors ought to be. But in any case you know why advertisers think it worthwhile to erect and maintain these billboards—it is that a large number of people pass along that highway, and therefore will see that billboard and presumably be influenced by it.

Consider, now, this situation as applied to forestry. Thousands of miles of highway run through forest country, and many millions of people drive over these highways yearly. We can say then: "Every vista of woodland—yes, every tree—is a natural billboard."

I am not advocating the nailing of signs to trees or even the erection of billboards on property which lumber companies own along the highways. Moreover I am not making the suggestion, though it may well be urged elsewhere, that a narrow strip of uncut forest should be preserved on either side of some highways for scenic purposes. What I am urging is that the forest itself, as made accessible by the highways, should be used to educate the public, first, as to what a forest is and as to what different types of forest may exist naturally; second, as to the relationship of man to the forest; that is, how he may work to its betterment or its ruin, and conversely how the forest may work for man's good or man's harm. I am thinking not of the forest primeval, but of the working forest; not of the forest as God made it, but of the forest as man has remade it, and sometimes unmade it; not of the forest which produces for the man or woman looking at it a vague feeling of awe and a sentimental and esthetic surge, but of the forest which produces wood as a hayfield produces hay or a vineyard produces grapes and which for the

[1] Address at annual meeting of the Northern California Section, Society of American Foresters, San Francisco, Calif., December 3, 1949.

individual yields boards to build him a house.

I shall consider, from the point of view of a Californian, two routes which might be used for the particular kind of educational demonstration. The first is California Highway 89, and the second U. S. Highway 40.

California 89 may be said to run from Lake Tahoe to Mt. Shasta. It passes by way of Truckee, Sierraville, Quincy, Mt. Lassen, and McCloud. The great virtue of this highway is that it traverses surprisingly large areas of still virgin forest and is therefore scenically very attractive. It has also (what we need for variety) the usual large areas of cut-over and burned-over country. It passes through many zones of tree-growth, and on Mt. Lassen rises clear into the alpine zone. From the educational point of view, however, it represents perhaps too complicated a profile, and it also labors under the great disadvantage of not being a heavily traveled highway.

U. S. 40 runs from San Francisco to Atlantic City, but the part of it that is our immediate concern would be that one, approximately, from Roseville, California, to Reno, Nevada, that is, the trans-Sierran sector. In comparison with California 89, this sector of U. S. 40 is inferior in that it has almost no primeval forest left along it. There is, however, a small area west of Cisco which has apparently never been cut over and which contains some good trees. There are also large Jeffrey pines in fair numbers still left on the east slope of Donner Pass, although these are growing at high altitude and stand so thinly as scarcely to give much impression of forest. In every other respect, however, U. S. 40 offers an ideal opportunity. In the first place, it carries very heavy traffic, much the heaviest of any trans-Sierran route, so that anything done along this road would be exposed to the view of many people. Moreover, this highway crosses the Sierra Nevada by the most direct route possible, and climbs steadily, rarely losing any altitude. For these reasons it displays excellently, and with utmost simplicity, the tree-zones of the Sierra. And if the forest cannot be seen in its full splendor in any of these zones, it can at least be seen in all stages of devastation and regrowth.

U. S. 40 has also another great advantage in being an interstate highway. The demonstration area should certainly be carried into Nevada. But since the highway is transcontinental, there is no reason why its use for demonstration might not be eventually extended through the Rocky Mountain area and even across the eastern states.

By this stage I hope that I have at least roused a curiosity as to exactly how one would go about establishing a "demonstration road." It is simple enough.

At properly selected spots and at properly spaced intervals, turnouts for cars would be constructed. Proper reading-material would be provided, presumably posted up behind glass, in ways that our national and state parks have already pioneered. The spot itself would be selected both for the close-up nature of the tree-growth and for the more distant vistas.

Let us illustrate by some spot that might be selected between Auburn and Colfax, around the two-thousand-foot level. When the tourist first pulls off the highway and parks his car, he is not much impressed by the scene. There are no tremendous redwoods such as he has viewed on Highway 101. There is no magnificent vista of peaks or waterfalls, such as he has been taught to admire in the national parks. Instead, he sees only, let us say, a thick growth of unimpressive trees that he would call merely "pines," or even, derogatorily, "bull pines." Most of the trees run only about six inches in diameter, and between them are others that seem to be in the process of being crowded out. If he looks closer, he sees that there are two or three other kinds of trees among the pines, though he may not be able to name them. Also a few trees are a good deal higher and older, and tower up among the others. Looking farther off, he sees a hillside with scarcely any trees at all, because it is mostly covered with a lighter-green, low growth.

Now we have the opportunity to catch his interest for our own ends. We can of course do the first obvious thing and identify the trees for him. But by itself this accomplished little. There is probably nothing duller in the world and nothing that the ordinary person forgets sooner than to be informed, by a label on the trunk, that a certain tree is "*Pinus ponderosa*, or Western Yellow Pine." We can do more than this. We should be able to tell him approximately when this particular tree sprouted from a seed, what its average growth has been, when it will be ready to be harvested, what will be the probable use of its wood. Then we can explain to him, not merely about the trees, but also about their conglomeration into what is known as a forest, with all the dynamic and dramatic features which can be seen right here in this second-growth of pine which is struggling ahead through its development into a harvestable forest. We should have discovered or deduced what history lies behind this particular spot and should let him know when it was cut, how it was reseeded, when it was burned over. We should make the light green area on the opposite hillside something more than a light green area, and should explain that it is the scar of a fire. We might even be able to discover exactly the days on which that particular fire burned, how many acres of trees it destroyed, what started it, and how soon by the natural course of events the trees seem likely to reduce the brush. I am not myself a forester, and yet I think that I could stand at any such seemingly common-place spot, and give a half-hour talk on what is happening.

In fact, the problem in this demonstration area would probably be, not what to say, but what to omit. There would be more to explain than one could well expect these tourists to take time to read and absorb. We should have to borrow something of the skill of the billboard advertiser, and tell only the most important facts.

And we should not forget the necessary "come-on." We should always leave the traveler with the information that a certain number of miles further along the road, he will come to another demonstration-point. We should take the east-bound traveler up through the mixed conifers, and then show him some sugar-pines, and take him on through the firs and across the alpine country and down the other side through the Jeffrey pine.

Just as there are too many facts to tell the tourist at any one turnout, so the good possibilities for turnouts are even more numerous than we can use. First of all, we would have to demonstrate such basic matters as the major tree-zones, and the various stages of re-growth. But just from memory I can recall, along U. S. 40, several points of special interest. Any one of these would really be worth a turnout, but probably most of them would have to be omitted.

Just below the three-thousand-foot marker, for instance, there is an area thickly grown with knob-cone pines. These are, I think, the only knobcone pines to be seen along U. S. 40. There must be some particular history that produced them at this spot. I presume that they are now being crowded out by some more dominant tree. This is interesting. But is it worthwhile to make a special stop for these knobcones?

As another example, near Dutch Flat the highway crosses some old hydraulic gold-workings. I do not know exactly when hydraulic work stopped here, probably about 1880. At that time the whole area had been completely stripped of trees and the soil itself washed away, almost—and in some places entirely—to bed rock. But now the ponderosa pines are taking it all back. In the fifteen years that I have kept the area under observation there has been a remarkable change. This is, I think, one of the most notable and dramatic examples of unaided reforestation to be seen anywhere in the country. Is this worth a stop?

Once again, slightly above Baxter's there is a sawdust pile from a mill that began to work, I am told, in the 1850's. The pile is still visible. There is a thick second-growth forest in the vicinity. The whole history of this area with respect to man could probably be worked out and vividly presented with the sawdust pile as the original text.

West of Emigrant Gap the road runs along a high ridge overgrown with brush but with an occasional old tree sticking up high and an occasional young tree just managing to break through the top of the brush. Here is an ideal spot at which to demonstrate the destructiveness of fire and also the cycle of growth that follows in its wake. I do not know the history of this fire, but it cannot be very ancient and some record of it must be preserved.

A mile or two above Emigrant Gap the highway swings in a wide arc rising on a fill. Somewhere near the center of this arc stands, I am told, the largest pine of all that area. Would it be worth our while to construct a spur road so that people could see this tree? Perhaps a turnout would be constructed here and the pine exposed to view by the cutting away of some of the smaller trees around it. But in any case I would use the large pine only as a center of interest, and would again focus most of the story about the whole forest situation as there presented.

But we should not be content to demonstrate merely what has happened by the blind accident of past years. We should also *create* centers of interest.

An area, though I should hope a small one, should be logged by old-fashioned methods, completely stripped, and left with the slash where it happened to fall. This should be presented as an example of how the thing should *not* be done, and besides it there should be an area which has been properly logged. Other areas where the trees are too small for logging should be used to show what can be accomplished by proper thinning. And there should certainly be plantations. Trees of different kinds should be used. Perhaps the Institute of Forest Genetics, instead of hiding itself on a back road near Placerville, might here come out along a main highway and demonstrate its blooded stock, which displays such marked growth in even a few years.

A great and continuing source of interest would, in fact, be the changes with time. Among the great sequoias, five years or a decade is a matter of no moment, and even the years of a man's life may well pass and leave him, bald-headed, looking at trees which have not changed to his eye since he was a curly-haired youngster. But when we are dealing with planted, or cut-over, or burned-over areas, or with any area of not too old second-growth, we shall have to change the placards every two or three years to keep them up-to-date with what the citizen is seeing.

A family, going and returning to the lake for summer vacation yearly, will learn to stop at the same spots and compare them with the year before. They will find the young trees growing faster than the children. After a few years the place will hardly be recognizable.

Particularly the plantations and the cut-over areas will change rapidly. New plantations will have to be set out, and new areas cut over. In spite of all watchfulness, fire will take a toll and change the appearance of other spots, and after fire either plantations or volunteer growth will again make for change. The public will have some new spectacle for every year.

Another advantage of this method of demonstration, especially along U. S. 40, would be that those interested in forestry would not have to work unaided.

The highway commission should be interested in cooperating to combine roadside picnic-grounds with the forest-demonstration turnouts. In supplying such facilities along its highways, California has, in fact, lagged by comparison with such states as Kansas, and should do better.

Such organizations as the California Historical Society and the Native Sons of the Golden West should also be eager to join in. With the possible exception of U. S. 101, U. S. 40 is the most highly historic route in California. It

roughly parallels the first emigrant road, which was the route of the Donner Party; it crosses the '49 country; it follows the line of the first transcontinental railroad. Additional markers, of historical interest, could be put up along with those of interest to forestry; one hand could wash the other, and expense might be shared.

Moreover, the demonstration areas would tend to attract more tourists to the route, and so forestry could count on the cooperation, quite possibly even the financial cooperation, of chambers of commerce, of highway associations, and even of private owners of resorts.

If the project seems to be a large one, I may point out that it does not need to begin large. Although a series of turnouts would obviously be the ultimate goal, we could begin with a single one, and at almost no expense. For instance, above Baxter's there is already a drinking-fountain in a forested region, and a few trees have been planted as a background for the fountain. This could easily, at negligible expense, be developed into the first of our turnouts.

There would of course be difficulties. Money would be needed for construction and maintenance. In addition to money we should need cooperation from many angles, and there might be administrative difficulties. The highway commission would certainly have to cooperate, and might view with some alarm the traffic hazards produced by this construction of more turnouts. There would have to be the cooperation of the U. S. Forest Service, of the State Division of Forestry, and of private owners, but one would think it likely that all of these could easily be interested. If the demonstration extended into Nevada, as it should, various departments of that state government would have to be drawn in.

There are difficulties, and there is also, I think, one danger. If you start this, you will, in the old back-woods phrase, "have a bear by the tail." Once well started, you will not be able to stop. Once established, such a demonstration-road would dramatize forests to the public and would endear itself to the public to such a degree that any effort to discontinue it would raise a howl of protest that would be heard in the halls of Sacramento, Carson City, and Washington.

In closing, I should try to correct any impression that this idea is essentially or exclusively tied up with U. S. 40. I have used that road as an example because I know it intimately, have used its background in several of my books, and have a considerable affection for it, and—more practically—because it carries heavy traffic and would therefore bring the message to a large number of people. As far as the forest itself is concerned, an equal opportunity is offered by U. S. 50, and by others of the trans-Sierran roads. Further investigation might in fact show that the project would accomplish more on a route along which people are likely to drive in somewhat leisurely fashion, even if fewer people drive there.

On one route or another, nevertheless, I believe that the idea is sound. The best opportunity of interesting people is likely to come, not when they are leading their ordinary busy lives, but when they are away from home and in a vacation-mood are ready to stop and see new things. Moreover, at such times they have the children along, and the impression made on a young mind is likely to be strong and to produce important results a few years in the future.

Forestry, like most other subjects, can be presented to the public best, I believe, not by books and articles, not by lectures, not by motion-pictures, but by concrete reality, in this case, the forest itself.

Income Tax Regulations and Long Term Forestry Programs[1]

E. T. F. Wohlenberg
Ukiah, California.

FORESTERS AS A GROUP are fairly familiar with the problems arising from the taxation of forest property under the *ad valorem* property tax. They know of the widespread tax delinquency and reversion of private lands during the depression of the 'thirties. They know of the discouraging effect of inequitable property taxes on forestry programs. And they know something of the remedial tax laws that have been passed by many of the states.

But foresters are not equally familiar with the federal income tax and its relation to long term forestry programs. Not only are they unfamiliar with the effect of income taxes on forestry but many of them are not fully informed of the provisions of the law or the regulations as they apply to the operation of a forest property. To help remedy this situation a committee of the Society of American Foresters were appointed in March 1949 to study the effect of income tax on the practice of forest on private lands.

The basic income tax law applies to forestry in the same way as it applies to other enterprises, with the exception of Section 117(j) and 117(k) which permit the taxpayer to report as capital gains the income from the sale or harvest of timber. The principal features of the law that the forest operator must understand are the reporting of capital gains or losses, the allowances for depletion and depreciation, and the reporting of expenditures as current expense or capital investment. In many of these procedures there are options the taxpayer may elect. Extension of these options or changes in the regulations have frequently been urged as a means of making forestry more attractive. The most important application of these proposals would be to the following:

1. Stand improvement
2. Reforestation (planting and seeding)
3. Fire protection
4. Amortization of roads
5. Depreciation of plant and equipment
6. Depletion allowances

The forest owner, whether he takes advantage of the capital gains provision or not, is interested in establishing a depletion basis. This is measured by the original cost of the timber (or value as of March 1, 1913 if acquired before then) plus carrying and development expense that has been capitalized in the timber account and not deducted annually as current expense. Depletion, prorated over the volume of timber owned, may be deducted from the value of the stumpage at the time of sale or harvest to establish taxable income. Obviously the greater the depletion basis the less will be the taxable income or gain at the time of harvest. But the only means of increasing the depletion basis is by foregoing annual deductions for carrying charges and improvements. And the choice of capitalizing these items or writing them off as current operating expense is binding on the taxpayer for future years once he makes his election.

It follows that the option to reduce current taxes by taking carrying and developmental costs as current deductions is not pure gain to the taxpayer. By electing this option he loses an opportunity to build up his depletion basis which would reduce capital gains at the time of harvest. The advantage in exercising this option is found when he is paying income tax during the developmental stage in brackets higher than those established for capital gains. The latter is now set at 25 percent for corporations. It might be raised or lowered by the time timber is ready for harvest.

With this brief background we may now consider the present regulations and proposals to change them in relation to the six important items mentioned above.

Stand Improvement

Problems relating both to depletion and to the write-off of improvement costs are encountered in stand improvement accounting. If the stand improvement takes out the dominant trees, as it might in managing for pulpwood production, the cutting has the nature of a harvest operation, and depletion should be figured on this basis. But if the stand improvement takes out suppressed trees or is a thinning operation, little of the original timber value will be depleted, as these trees may not have been included in the cruise on which depletion was based. If costs of thinning or improving young stands exceed the value of saleable products recovered these net costs may be written off as expense or capitalized to increase the depletion basis. Costs of girdling, poisoning, and pruning introduce similar problems of accounting.

Reforestation

Planting and seeding costs at the present time must be capitalized but the opinion is often expressed that if these costs could be written off as expense these practices would tend to be stimulated. But again we find the double-edged sword. If the costs of planting or seeding were written off there would be no capital value established for depletion. From an accounting and tax standpoint it must be recognized that most operators would rather do this work and write off the cost during periods of high income. This procedure would undoubtedly stimulate planting to a certain extent, but it might result in accentuating the variations in planting programs in periods of high and low earnings.

Fire Protection

At the present time the write-offs for fire protection are quite favorable under the federal income tax

[1] The substance of this article was presented to a joint meeting of the Divisions of Economics and Private Forestry at the annual meeting of the Society of American Foresters, Seattle, Washington, October 12, 1949.

laws. Costs of development work such as fire trails, minor roads, and development of water are usually written off as annual expense. The only change that might favor forestry would be permission to write off the cost of some major development in fire protection that is now treated as a capital investment. This change might stimulate such improvements during a favorable write-off period; that is, when earnings force the owner into the higher income tax brackets. There is still considerable difference of opinion as to what fire protection costs should be capitalized and what should be written off. More study is needed to develop procedures that will be most favorable from an income tax standpoint.

Amortization of Roads

Amortization of roads is a problem that will have to be considered in a long time forestry operation. The original development of a transportation system for most areas is quite costly. The tendency of some of the income tax authorities is to consider main roads as capital investment on a permanent operation. And since these costs might be capitalized in the land account they could not be recovered through depletion. In order to make these procedures more favorable to forestry it seems to me that at least 80 percent of the cost of major roads should be written off in the first cycle and that only a salvage value should be left on these roads for future operations. This is reasonable because, in most cases, the roads must be improved in each cycle of operation, and much of their original value is gone.

Depreciation of Plant and Equipment

Depreciation, obsolescence, and amortization can all be classed in one category. These write-offs are made over a period of years, which may be measured by the actual exhaustion of the equipment or may be affected by obsolescence resulting from changes in the industry. These changes must be watched closely in a forestry operation if the plant is to be kept up to date. The plant and equipment on a long term operation is bound to change because of the differences in species as well as changes in the size of timber that will be cut in the succeeding cycles of operation. Allowances for depreciation should be great enough to permit a replacement of equipment to meet these changes. As a rule this is quite well taken care of under present regulations, but it needs to be watched. Greater utilization of waste would be encouraged in many plants if favorable write-offs could be obtained.

Depletion Allowances

Depletion is the write-off of the value of the timber, and the write-off is taken when timber is harvested. It must be written off in such a way that the values which are taken out of the stand are recovered, and the capital is returned to function in the sustained yield operation to follow.

The type of forestry practiced has a very decided effect on the amount of depletion that should be written off for every thousand feet cut. This is particularly important during the period of transition between old growth timber and second growth grown as a crop. Accelerated depletion is permitted when higher values are removed first and is calculated on the percent of value removed from the stand rather than on percent of volume, which results in a fixed rate per thousand feet. This tends to stimulate forestry in that when mature and over-mature trees are taken out, representing possibly 30 or 40 percent of the volume, it is quite possible that 60 or 70 percent of the value can be written off. The younger immature trees are then carried at a correspondingly lower value. This provides a much more favorable set-up for a company in carrying the growing timber through the next cycle.

The depletion problem presents a large and important field for study. Favorable tax treatment along with correct accounting practices can do much to stimulate better forestry. Stand structure studies are very important in this connection as they reveal many things that can be of advantage from a financial as well as a forestry standpoint. These studies are particularly important in relation to the conversion of present old growth stands in the West to sustained yield operations.

Depreciation, obsolescence, and amortization will continue to be treated as at present when actual sustained yield is reached. The concept of depletion will be changed, however. Growth will equal depletion when the industry reaches sustained yield and income from growth will off-set deductions for depletion. In the many different types of operations there will be some variations but basically this will be the situation finally reached.

The transition from liquidation to sustained yield is one of the most difficult periods financially for a forestry operation. Subsidies to the industry during this transition are not desirable, for subsidies drain the federal treasury and give a false idea of what is being accomplished. But changes in income tax regulations that are justified on a sound economic basis could do much to ease and encourage the establishment of sustained yield forestry.

The Society committee to study the effect of income taxes on long term forestry programs[2] is now formulating plans of study and exploring methods by which these studies can be conducted. Suggestions from members of the Society of American Foresters and others as to field or methods of study, transmitted to any of the committee members, will be greatly appreciated.

[2]Membership of this Committee is Ralph W. Marquis, chairman, Lloyd P. Blackwell, W. D. Hagenstein, E. G. Wiesehuegel and E. F. T. Wohlenberg.

The Rehabilitation of the Tillamook Burn[1]

John B. Woods, Jr.
Oregon State Board of Forestry, Salem.

THE AUTHORIZATION for the sale of the first issue of Oregon Forest Rehabilitation and Reforestation Bonds was signed on July 18, 1949 by members of the Oregon State Board of Forestry. This ceremony, which took place at the Owl fire camp in the heart of the Tillamook burn, marked the beginning of the Tillamook burn rehabilitation program.

To residents of the Northwest the story of the Tillamook burn is all too familiar, but for the benefit of those from distant states, I would like to relate briefly the story of the series of Tillamook fires and the history of the developments, legislative and otherwise, which culminated with the ceremony at the Owl camp.

On a logging operation near Gales Creek in Washington county, on August 14, 1933, a day of high temperature, low humidity and strong east wind, a spark was generated through the friction of a log being yarded over a dry cedar windfall. The fire which flared up was spotted immediately and all hands pitched in to put it out. But despite their frantic efforts, burning embers were carried by the wind into an adjacent slashing where they quickly took hold. The fire gained momentum and had soon crowned into green timber and was away.

The country was rough, undeveloped, and inaccessible and the 3,000 men rushed to the fire lines were unable to stop the fire's spread. Eleven days after the start of the fire 270,000 acres of high value virgin timber had been killed.

In 1939 a second fire broke out and burned uncontrolled until it had covered 225,000 acres. Much of this acreage was reburn of the original fire, but 28,000 acres of green timber also were destroyed. In the reburned areas some seed sources had remained and natural stocking had become well established on several thousand acres. The 1939 fire destroyed this reproduction as well as the seed sources and precluded forever the possibility of any future natural restocking.

The final blow came in 1945. A fire started on the south fork of the Wilson River and spread to join a second fire burning in the Salmonberry drainage to the north. On these fires, which together burned 110,000 acres, the utter futility of attempting to control fires in a sea of snags, in rough terrain without access roads or fire breaks of any kind, was brought forcibly home.

The Tillamook burn of today encompasses a net acreage of some 311,000 acres. A few thousand acres of the original stand remain in green islands which have miraculously escaped the three blazes. In portions of the 1933 burn which have not reburned, moderate to good natural restocking can be found. But on most of the burn the ground has been scorched clean, with no green trees remaining to scatter seed. Further stocking will be obtained only through artificial reforestation.

Shortly after the 1945 fire the late Governor Earl Snell appointed a special committee to investigate the possibilities of rehabilitating the Tillamook burn and other denuded areas, and of improving generally the fire protection afforded state and private forest lands.

Following a series of public hearings this committee published a comprehensive report. Among its numerous recommendations was the proposal that an intensive protection and reforestation program be initiated immediately in the Tillamook burn. This program was to be directed by a state corporation which would derive its finances through the issuance of long-term bonds. The committee also recommended that as a means of financing general forestry needs, careful study be given the levy of a special use tax combined with an appropriation from general funds on an equitable basis.

The recommendations of the Governor's committee became a major issues of the 1947 legislative session. The legislature enacted the State Forest Research and Experimental Tax Act, and passed a joint resolution which referred to the people a proposal to finance the rehabilitation of state-owned forest lands through the issuance of long-term bonds.

The Oregon Forest Rehabilitation and Reforestation Bond measure was approved by the people in the 1948 general election, and the necessary enabling legislation was enacted by the 1949 legislature. Under this law bonds may be issued in an amount not to exceed $^3/_4$ of 1 percent of the assessed valuation of the taxable real property in the state. Since the present assessed valuation of real property in Oregon is $1^1/_4$ billion dollars, approximately ten million dollars in rehabilitation bonds may be issued. The issuance of bonds in any one year is limited to $750,000 and the money derived from their sale may be used solely for the protection, management, and rehabilitation of state-owned forest lands.

The State Forest Research and Experimental Tax Act calls for a tax of five cents per thousand board feet on the severance of timber and other forest products. The proceeds are used for research in forest products and forest management. Collections are made quarterly and 60 percent of the revenue is allocated to the Oregon Forest Products Laboratory, and 40 percent goes to the State Forestry Department.

When the law became effective in July 1947 a program of research in silviculture, forest protection, and forest management was inaugurated by the state forester. Under

[1]Presented at the annual meeting, Society of American Foresters, Seattle, Wash., October 11, 1949.

this program special emphasis was given to the development of hazard reduction techniques for high-hazard areas and to the development and testing of methods of reforestation. Through these experiments both information of general value and data specifically applicable to the Tillamook burn rehabilitation problem have been obtained. The hazard reduction program included experiments to determine the feasibility and approximate costs of broadcast snag falling in high-hazard areas, and of the construction of snag-free corridors and access roads.

Along the line of planting research, planting tools and techniques have been developed and tested and comparative tests have been made to determine the adaptability of various species and planting patterns.

In 1943 the State Forestry Department had tested direct seeding as a means of artificial reforestation. Workable spot-seeding tools and hand-seeding methods were devised and through cooperation with the U. S. Fish and Wildlife Service a satisfactory system of rodent control was developed.

In the winter of 1946 an experiment in aerial seeding was conducted. Following aerial rodent control, 600 acres were seeded by airplane with a mixture of seed consisting principally of Douglas-fir and Port Orford cedar, with lesser amounts of Sitka spruce and Western hemlock. The area chosen for this experiment was on the edge of the 1945 Salmonberry fire and offered an excellent variety in degrees of burn, exposures, soil conditions and amounts and types of vegetative cover.

The results of this experiment offer high hopes for the use of aerial seeding in reforestation. Definite limitations as to applicable seed species and sites were noted. But on favorable exposures having favorable soil and cover conditions, Douglas-fir stands of 750 to 1,500 trees per acre were established with only one-quarter pound of seed per acre, and at a cost of a little over five dollars per acre. On less favorable sites Douglas-fir stands of from only 59 to 749 trees per acre were found, but there is reason to believe that by increasing the seeding rate to one-third or to one-half pound per acre adequate stands might be established on such sites.

With funds derived from the Research Tax Act additional extensive experiments have been conducted in aerial seeding. Because of seed shortages these experiments were delayed until 1948 and positive results are not yet obtainable. However, preliminary results substantiate the findings of the 1945 experiment.

In July, 1949 the rehabilitation law became effective. Prior to that time the basic planning for the Tillamook burn program had been completed and as soon as funds were assured, the preliminary field work was begun.

The plan of rehabilitation for the Burn is based on the logical premise that it would be inadvisable to do any extensive reforestation until protection developments sufficient to reduce the hazard to a reasonable level have been completed. Therefore, the first step in the program will be the construction of access roads and snag-free corridors, and provision of supplementary protection structures, personnel and equipment.

Reforestation activities will follow protection developments and will be keyed with snag-salvage operations which were started immediately after the 1933 fire and may be expected to continue for at least another decade. No reforestation will be done in any specific area until salvage operations are completed. Roughly one-half of the burn area has been salvage-logged and, therefore, no serious delay in the reforestation program is expected. It is hoped that the major portion of the rehabilitation program will be completed within the next fifteen years.

The ownership pattern of the Tillamook burn and adjacent areas lends itself very well to a coordinated rehabilitation program. Of the total burn of 311,000 acres, approximately 260,000 or 84 percent is owned by the State. A small portion of the remainder is federal land and the rest is in private ownership, mostly in large blocks.

In order to utilize to the best advantage all personnel and facilities of the Oregon State Forestry Department, each of the three departmental divisions has been assigned a phase of the rehabilitation program. The Lands Division, which manages all state forest lands, will direct the surveying and over-all planning; the Protection Division will, through its district personnel, carry out the program in the field; and the Conservation and Research Division will conduct an intensive and continuing research program to provide needed data and techniques.

The nature and scope of the proposed program can best be illustrated by a description of the measures already completed and planned.

In June, 1949 survey crews conducted preliminary field surveys for the 1949-1950 program. Three types of surveys were made on 26,000 acres as follows: (1) Boundary surveys to determine the exact location of state-owned lands, to re-establish corner markers and to establish necessary boundary markers; (2) Preplanting surveys to determine through intensive analyses of natural restocking, seed sources, cover types, soil conditions, degrees of burn, snag concentrations and topographic conditions, reforestation needs and adaptability of individual areas to aerial seeding, spot seeding or hand planting; and (3) Protection surveys to determine the need for and to select locations of access roads, snag-free corridors, look-out and guard and suppression-crew station sites. Supplementary fire prevention and suppression measures and personnel and equipment needed to provide protection commensurate with the hazard were also determined.

The present basic snag-free corridor and access-road plan calls for one main north-and-south combined access road and snag-free corridor separating the Hillsboro, Forest Grove, and McMinnville watersheds from the main body of the burn; and one main east-and-

west snag-free corridor following the Wilson River highway and dividing the burn area roughly in half.

Two secondary east-and-west combined access roads and snag-free corridors will originate from the main north-and-south break and will further subdivide the main body of the burn. Additional secondary roads and corridors will be constructed as the rehabilitation work progresses.

The width of the snag-free corridors will vary from a few hundred feet to a maximum of 2,000 feet, depending upon topography, snag concentrations and other physical features. Access roads will be constructed in advance of snag-falling operations and will be permanently maintained for protection purposes.

Most of the snag falling will be done by contract with bids let through competition, if this procedure proves to be practical and economical. Following the completion of snag falling, salvable logs will be offered for sale and low-value materials will be decked and burned.

The proposed supplementary protection plan calls for the construction within the next three years of five additional lookouts. Also quarters, personnel and equipment are to be provided for two five-man and three four-man suppression crews. These measures will require a total capital outlay for the three-year period of approximately $21,000, and by 1952 will require an annual operating cost of approximately $19,500. These expenditures are supplementary to costs of protection already provided.

The 1949-1950 reforestation plan provides for aerial seeding of approximately ten thousand acres and hand planting of one thousand acres. Six tons of seed have been ordered and four tons have already been delivered. Contracts for aerial rodent baiting and seeding by helicopter were let in late August and baiting operations were begun on September 22, 1949. In the low elevations Douglas-fir will be seeded at a rate of one-third pound per acre. Areas 2,500 feet or over in elevation will be seeded with a mixture of equal weights of Douglas-fir and noble fir, applied at a rate of one-half pound per acre. Present estimates indicate that the total cost for materials and services will be less than four dollars per acre.

The 1949-1950 hand planting program will be somewhat limited because of a shortage of nursery stock. However, 20 additional acres are being added to the state nursery and the expected annual production of five million trees a year beginning next year will sustain an extensive program. Planting in 1950 will be done by state crews, but it is proposed that when the large-scale planting program gets underway most of it will be done by contractors.

That, briefly, is the background, the over-all plan and the 1949-1950 program for the rehabilitation of the Tillamook burn. Naturally, as the work progresses revisions and improvements will be made, but it is felt that the proposed program is fundamentally sound and should in reasonably short time restore the Tillamook burn to productive condition.

On September 18, State Forester Nelson S. Rogers passed away after a long and painful illness. The reforestation of the Tillamook burn was his big dream. Nels did not live to see the Big Burn "greened up," but before he died, through his leadership, his inspiration and his tireless efforts he had laid the ground work for the program and had made it possible for the work to be done. For those of us who worked with and for Nels Rogers the new forest which is to grow in the Tillamook burn will be his lasting memorial.

Notes

On the History of Forestry

As one of the old-timers, the word in the December JOURNAL on the pending publication of the *History of Forestry* naturally revives many memories.

How much of the early, personal history has been told, or how much of it has been lost, probably does not matter. The present generation of foresters has too much to do in finally practicing a little woods forestry, and in learning to live in a changing and troubled world to care much about the past. It remains, perhaps, for the oldsters to reminisce when any one will listen.

We were once told that forestry might some day "attain the dignity of a profession," and later by Dr. Fernow that we could not hope to practice in our wild woods the textbook science of forestry that he taught. The history so far will prove that both assumptions hold true.

To those of us who started in the Bureau of Forestry, under Gifford Pinchot, the names of the men who helped make forestry history then and since will always be linked with the time when there were so few to do so many things in so many places. This is not the place to review who these men were and what they did, but it is hoped they will have their place in the history now written.

The same is true of the old Cornell Forest School (the first New York State College of Forestry) where there were also men whose names will always be part of forestry history. The memories of these men are pleasant to recall, and they, too, should live in history as an inspiration to the young foresters of today.

An historical milestone is Vol. 1, No. 1, of the *Forestry Quarterly*, dated October 1902. It was "in the main a student publication," published at Cornell University under the direction of a "Board of Advisors of the Faculty and Alumni of the New York State College of Forestry." As the daddy of the JOURNAL OF FORESTRY, it was the first open forum for the millions of wise and otherwise words on forestry that have been printed in the JOURNAL since then. It started "with due modesty, . . . when the light of forestry was just dawning in this country."

These early milestones marked the trail of a pioneer profession in the making. The older generation of foresters has been a part of it almost from the beginning. What they have seen and done in helping build the lengthening trail to recognition holds much of wide human interest, aside from forestry itself. Perhaps some day, a forester with the literary style of a Vandyke or Thoreau will write a classic of the glorified side of forestry—the part about the gleam of the wilderness campfire at twilight, out where "the red gods call." If he does, we wonder who would read it, and, anyhow, it will probably rain before morning, the tent will leak, and the dead campfire will be anything but romantic in the soggy dawn.

Although the educational field in forestry expanded rapidly, there were several reasons for the much slower development of actual woods practice. Some of these are found in Cotta's preface to the first *Forestry Quarterly*. (Heinrich Cotta was born in Thuringia in 1763.) He says, "Three principal reasons exist why forestry is so backward; first, the long time which wood needs for its development; second, the great variety of sites on which it grows; thirdly, the fact that the forester who practices much writes but little, and he who writes much practices but little." No one today could better epitomize our American forestry situation.

What matters most is the progress made in the face of things as they were and are. We have had the earlier period of talk, hopes, and academic forestry, when private forestry could not pay its way; the fortunate development of federal and state forest agencies and forests, as a public service at public expense, which gave opportunity for the growing crop of young foresters to earn and learn; and now the general awareness and acceptance of forestry as a profession and a business.

How the progress during this first half-century will be viewed when mellowed by another fifty years can only be guessed. Much of it is so recent that the historical perspective is not yet clear. When some of the husky boys now in forest school look back years later to this mid-century point, they may see it as the beginning of the era of economic application of forestry. At any rate, industrial forestry has become a large scale business enterprise, for the simple reason that the forest industries cannot afford to run out of wood. This makes it certain that a much greater number of foresters will be supported by the income from the trees they grow and use.

Regardless of the progress made so far it can be agreed that there is no reason for complacency, nor is that the attitude. What remains to be done in education, cooperation, and better forest management is all too evident. The gypo sawmills, small woodlot owner, and others who need or prefer dollars today, rather than trees and income tomorrow, are still with us. This is nothing new, no critical shortage of timber is imminent, and with the present spirit and incentive there is a better prospect that enough can be done, fast enough, to bridge the transition period and really grow the trees needed for tomorrow. At best, it is a big job.

If any excuse is needed for this look backward, with a peek ahead, it is that one cannot live through most of our forestry history without getting some ideas about what has happened and what lies ahead.

E. A. STERLING,
Montrose, Pa.

Proposed Rapid Reconnaissance of Forests of the Amazon and Orinoco Basins

South America, like North America in the past, is rapidly destroying its forest resource. There is apparently little knowledge of the vast acreage of timber destroyed by fire in all the forests of South America.

From the Gran Chaco region of Argentine, to the delta region of the Orinoco, fires and shifting agriculture are annually destroying hundreds of thousands of acres of commercial timber. This timber is practically a 100 percent loss.

As a rule, fires and agricultural fellings are in regions beyond commercial transportation, and for this reason the trees felled are used only locally for fencing and temporary construction. The great bulk of the logs are burned to enable the owners to grow agricultural crops or to clear the land for grazing.

After these lands are cleared, they sometimes return to forest, but as a rule they are subject to annual burning, and finally become vast areas in grass and scattered trees, yielding scant revenues from the grazing of half wild cattle.

The Andes and Coastal Mountains in Venezuela, and the plains in central Venezuela are a perfect picture of this class of forest destruction.

Colombia, Ecuador, Peru, Bolivia, Brazil, and Argentine show vast areas where the forests have been destroyed by the advance of agricultural interests in areas which are marginal from the agricultural point of view, and will give the greatest economical returns, if retained under forest cover.

South America's interest in bringing millions of farm laborers from other countries to develop agricultural lands, will mean a further vast destruction of her forests unless an immediate forest survey is made of the remaining forest areas.

This means, also, that the technicians making this survey should employ a group of young men for each of the countries interested, and these field forces should include all the available local trained foresters in each country. During the survey, or after its completion, the young men proved suitable for forest administration and research, should be given the technical training needed for the successful administration of the areas to remain permanently in forests. These men will also take charge of the rational exploitation of the areas which can yield commercial forest crops.

This system has proved efficient in the surveys and administration of North American forests during the past fifty years.

Philippine forests were surveyed, young men trained for administration after field experience, and these young men were sent to forestry schools for training. Courses in forestry were established in the University of the Philippines and the bulk of the forest technicians employed in the Islands were trained, or are being trained in the University Forest School. An interesting result of this early survey and training is the fact that practically the entire commercial forests of the Philippines belong to the nation as a whole, are in forest reserves, and are under administration by technical foresters. A large modern forest industry exists in the Islands. The Islands supply the local needs for forest products, and have a profitable export. For every dollar spent by the government for the protection and administration of the forest wealth, it receives a net profit of 75 to 100 percent on its investment.

A similar result is possible if the South American republics will at once take steps for the protection and utilization of the remaining virgin forests. The vast area from which the forests have been removed, must have their forest cover replaced to prevent soil erosion and the drying up of the water courses in agricultural regions.

If South America will immediately start its forest survey and the training of the necessary personnel, the forest industries established will provide revenues for all administration purposes, fire protection, and reforestation. The forest survey, in addition to providing a permanent revenue from forest products, will determine what areas may be possibly opened for permanent agriculture, and the sale and use of these lands will add a huge revenue and adhere to economic health of the regions under forest management.

Details of the Proposed Survey

The survey can be made within five years (or less time) if funds and personnel are provided.

A group of economists, geographers, and foresters should be selected representing the different countries and a central office provided, where all available data on land classification (areas in forest, grass, and agriculture, etc.) could be centralized. All this information should be tabulated and shown on maps.

A field force should be organized at the same time, and work undertaken in the forest regions to be studied. A permanent base should be established in some central locality with good transportation and other good communicating facilities. This central station should provide for the health and care of the personnel engaged in the survey.

Once the central station is in operation, an aerial survey of the entire region should be made, with special attention to the boundaries of the forest areas. Later on, in areas shown to contain commercial forests, ground surveys should be undertaken and the commercial possibilities determined (cost, transportation uses of the timber, etc.).

Forest products found in quantities by these surveys should be sampled, tested in forest products laboratories, and the indicated uses determined by actual fabrication tests.

Very little cost beyond field subsistance need be borne by the different governments, as the work can be accomplished by the planes now owned and operated by these governments, and by field parties using government-owned transportation, and existing personnel in government departments.

As an example of the approximate cost for a survey of this class, Venezuela is placing a field party of four technicians, and using government or private planes for the air work. This party covers an entire state in from one to two months, and the entire field cost runs around $3,000 per month.

This plan is to be submitted to various experts including the Pan-American Union and F.A.O. for changes and suggestions. Then the approved plan will be submitted to the various countries with forest holdings in South America. It is believed that this is an opportune time for South America to ask the United Nations for the survey, and it is understood that funds covering the entire expense could be found if a united effort were made by the interested countries.

H. M. CURRAN.
Tropical Forester,
Technician Direction Forestal,
Ministerio de Agricultura y Cria.
Caracas, Venezuela.

Guiding Principles

The following letter was written in 1935 by Arthur F. Fischer who was then director of forestry of the Philippines at Manila. It was sent to a young forester who had been appointed to a new station in the provinces. A copy of this letter recently came into the hands of the editor who believes that it is worthy of publication both for its inspirational message and its credo of faith in the profession. Col. Fischer, a Fellow of the Society, is now director of the San Diego Natural History Museum in Balboa Park, San Diego, Calif.

"You have asked me for guiding principles in conducting the forestry profession in the Islands and in 'steering a course through life's highways and getting a start in life.' First, let me state that basic principles are the same in forestry as in any other walk of life. Man is the lever which moves everything worth while in civilization and the character and personality of the man in the final analysis are what really counts in any profession or vocation. You probably have heard me say that it is not what you think of yourself but what others think of you which gives you your reputation in the community. In other words, it is not your daily routine of time or length of life but it is the worth you have put into the time you live that makes it valuable, and as your fellow man recognizes your worth, to that extent will your influence in your professional field be extended. Treat your fellow man with sincerity, with fairness, with frankness, without hypocrisy, and you will win their respect, for without respect there can be no faith in you and without faith, your worth is greatly reduced.

"In forestry, you have studied the forest, a community of trees, vines, ferns, lichens, mosses, etc., all living in comparative harmony, although you know there are epiphytes growing on other plants for support, there are parasites living off a host at whose expense they attain their food and shelter, and saprophytes living on dead or decaying matter. Your human community has all these stages exemplified in its mass, and many of your laws and methods of handling forests to attain a normal forest are applicable to your human community.

"You know that trees find their normal place in the scheme of things in a forest and the dominant ones stand out to give it its type; others which cannot by the very nature of things become dominant have their place and perform their function in the scheme of things. So you will also find human society. Your dipterocarps are your dominant type family in the Indo-Malayan region; your conifers in the temperate regions. They have through time adapted themselves by living a life which gave their family survival value, and one might say by living healthily, moderately, morally they have used all their energies to fit environment; they have not lost interest in life because interest in life is really life itself. These individuals have all subordinated themselves to the group or family, to their ideals one might say; and have so ordered their life habits to conform to group survival and as a result are dominant and give their name to the type in their portion of God's footstool.

"You cannot hope to influence civilization through forestry and the protection of natural resources unless you have a real love for your work and intense interest in your profession. You must develop an enthusiasm and a crusading spirit to influence your fellow man to develop an interest in and a guardianship for that other form of life which culminates in what we call a forest. You can have laws, rules, regulations, programs, working plans on paper, but unless you have men who are honest, truthful, courageous, and are not afraid of responsibility and above all who have a real crusader's spirit of conservation, it will not have any survival value.

"Very few have the viewpoint that we are part of eternity and that as far as we know our eternity begins when we are born. You and I are placed in this world for an object; you and I are trained in the conservation of natural resources; you and I have even greater possibilities of dabbling in eternity through the medium of forests than are vouchsafed the mass of human beings. We are trained and let us hope intelligent in the use of our training, and give survival value through manipulation and protection to the form of life which is the source of many of the essentials of human existence, and we thereby give survival value to ourselves in the cycle of

life. I like to think of our work that way; it gives me a feeling that our work is distinctly worth while and it gives me strength to take it on the chin and not lose my interest when political or other handicaps appear to frustrate or interfere with continuity of policy.

"I do not know if I have helped you any, but I want you to get an inkling of what has actuated me all these years."

Possible Soil Restoration on "Overgrazed" Recreational Areas

Many recreational areas where there is a continued concentration of people, as in picnic and camping areas, show signs of trees failing rapidly, that now should be in their prime.

This is caused principally by "overgrazing," similar to that in pastures with too many live stock. The many hundreds of feet tramping daily or weekly over the same area, break down the litter and humus into a dusty powder, which is either blown or washed away, or carried away on the legs and clothing of the picnickers and campers. The remaining mineral soil is packed to a stone-like hardness.

With this compact soil condition, the trees are deprived of a large percentage of water due to surface runoff, and the tree roots get an insufficient amount of oxygen for normal tree growth.

It is suggested that during the off seasons of the year when the areas have little or no use, a layer of not less than 2 inches of saw dust be spread over these areas. Then if conditions permit, run a rototiller over it with its tines set to not more than a 2-inch depth, to incorporate the saw dust into the soil. The shallow tilling will prevent cutting the surface roots of the trees.

On an area where a rototiller would not be practical, the saw dust would become incorporated to some extent through frost action, by its making small fissures in the soil, which allow the sawdust to drop into them.

Saw dust would increase the water holding capacity greatly and make the soil more permeable and mellow. Being a coarse material, it would not pack easily. It would have a springy or cushion-like action when walked on, with a tendency for it not to pack very readily. As it decayed, it would furnish food for vegetation, earth worms, and other animal life of the soil which help in the aeration and the incorporation of organic material with the mineral soil.

It would also probably aid grass areas, if a thin layer of saw dust were to be raked into the grass. The soil to be planted with grass, should also be aided by first spreading a depth of about 3 inches of saw dust on the area before the soil is prepared with a rototiller for seeding.

An addition of a little fertilizer, high in nitrogen content, would also be advantageous, since saw dust has a tendency to absorb some nitrogen from the soil. It would aid in giving the vegetative cover a rejuvenating boost.

A. J. APPEL,
Forest Superintendent,
Jenny Jump State Forest,
Hope, N. J.

Latin-American Commission

The second session of the Latin-American Forestry and Forest Products Commission met November 1949 in Lima, Peru. Delegates from Bolivia, Chile, Dominican Republic, El Salvador, France, Nicaragua, Paraguay, Peru, United Kingdom, United States of America, and Venezuela attended. Representatives of the Organization of American States, International Refugee Organization, International Labor Organization, and Service Co-operative Inter-Américain de Production Agricole, also took part in the sessions. Mr. Jorge Succar Rahme, who heads the forestry subcommittee of Peru's National FAO Committee, was elected chairman of the session.

An agenda item which aroused much discussion was the organization and functioning of the proposed Latin-American Forest Research and Training Institute. The project was approved in principle.

In regard to a proposition to establish a Soil Conservation Institute, the commission felt that a multiplicity of separate institutes must be avoided and suggested that problems of soil conservation might well be taken care of by a division of the Forest Research and Training Institute.

Further progress was made regarding the course which the development of forest production and the timber trade should take in Latin America. The secretariat was directed to obtain further information on specifications, available quantities, and prices of logging and industrial equipment required by several countries; and the Commission stressed the great need for an expansion of technical assistance, which FAO could properly undertake under the new United Nations technical assistance program. It was emphasized that it was not only the softwood trade which must be developed but all trade in forest products, especially hardwoods and secondary products which could find good markets through a concerted action by all interested parties. Grading practices presently in use in Europe and North America are to be made widely known in Latin-American countries.

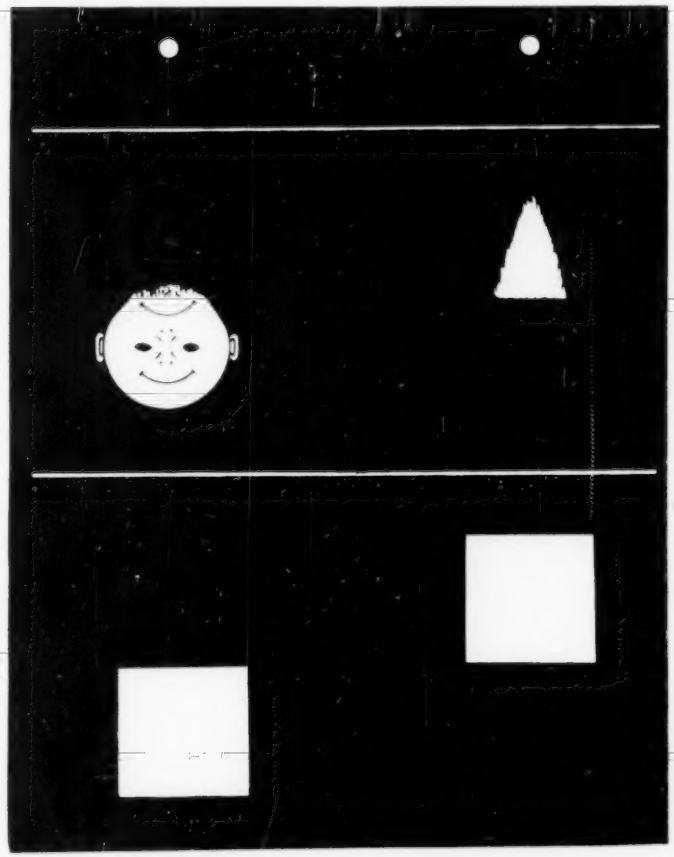
Although most Latin-American countries officially used the metric system, the lumber trade in the same countries used the board foot as a unit. The Commission recommended the use of one system only for the future, in consultation with the Pan-American Committee on Technical Standards. Standardized commercial dimensions and descriptive terms were suggested for hardwood lumber, and a preliminary list drawn up of uniform trade names for the more common timbers.

The Commission recommended that countries centralize responsibility for the compilation of forestry statistics in a single office or official who could communicate directly with FAO.

Determining Relative Illumination For Overlapping Photos For Maximum Stereoscopic Effect

The ease and accuracy with which a forester can extract useful information from a stereoscopic pair of aerial photos is dependent upon the clarity with which he perceives the three-dimensional image. The maximum stereoscopic effect will be achieved when the left and right eye images are seen with equal clarity. If one eye of the observer is somewhat weaker than the other, left and right eye images will not be seen with equal clarity unless the illumination of the two prints is adjusted so as to favor the weaker eye.

The accompanying figure provides a simple means for determining the relative illumination which should be given the left and right eye images so that they can be seen with equal clarity. If the two dots at the top of the figure are first fused stereoscopically, the hat will then appear to rest on the man's head and the two squares at the bottom of the figure will appear to rest one above the other. If the observer's left eye is weaker than his right, the man's head and the left square will appear distinctly darker in tone than do their right eye counterparts. Rotating the figure 180° with respect to the observer and again studying it stereoscopically will show that the objects which previously appeared darker in tone now appear brighter because they are now being viewed with the stronger eye. By slightly increasing the intensity of light striking the image seen by the weaker eye, or by slightly shading the image seen by the stronger eye, the two image tones can be made to match perfectly. The relative illumination of the two images which satisfies this condition should also be used in studying for maximum stereoscopic effect. This is based on the assumption that the two photographic prints have been reasonably well matched for photographic tone at the time of printing. Such an assumption is valid for virtually all photography available of forested areas in the United States.



Since to the writer's knowledge this is an original idea, the method has been tested to date only by some 60 of his students and colleagues, most of whom feel it has considerable merit. One classroom application of the method which the writer has made is to seat photogrammetry students whose two eyes are of unequal strength nearest the windows of the classroom at the time they are studying the photos and facing in a direction which will give the stronger illumination to the image seen by the weaker eye. Where a gooseneck lamp or other portable light source is employed an even closer matching of the brightness of right and left eye images can be effected, simply by shifting the lamp around until the images seen in the accompanying stereogram are matched for tone.

R. N. Colwell,
School of Forestry,
University of California.

Caliper for Small Stems

In studies of reproduction or of understory succession it is often necessary to obtain rapid but accurate measurements of large numbers of small stems. The common instrument for this purpose is the tree-fork described by Cummings (*2,3*) and Aamodt (*1*). If it has a wide range of legible graduations, however, such an instrument is too long for easy use in brushy

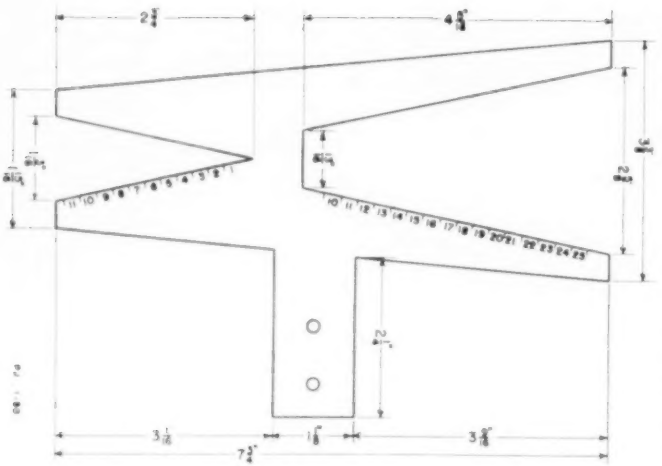


FIG. 1.—Caliper for small stems.

areas. The caliper described here attempts to avoid this disadvantage by placing two short gullets base to base. A model with two gullets side by side proved difficult to use in brush.

Dimensions of the instrument are shown in Figure 1. The tab is for attaching a short wooden handle. The scales overlap a little so that trees in the zone between 0.9 and 1.2 inches can be measured with either end of the instrument.

The two calipers now in use were cut from a sheet of aluminum alloy 1.16-inch thick. Black paint was used as a finish. When the paint was dry the graduations were scratched in it, exposing the bright metal. Stamped graduations are more durable but less legible. Graduations were placed on both faces of the instrument.

The scale lines represent class limits (not mid-points) of the inscribed tenth-inch classes. For example, any stem which touches the fork in the interval inscribed "7" is in the 0.7-inch class. The lower limit for 7 is located where the legs of the fork will engage a stem 0.65 inch in diameter, the upper limit where the legs engage a 0.75-inch stem. These points may be located empirically or calculated trigonometrically.

Literature Cited

1. AAMODT, E. E. 1941. A stem caliper gauge for nurseries. Jour. Forestry 39:728.
2. CUMMINGS, W. H. 1939. Diameter class gauges for small stems. Jour. Forestry 37:349.
3. ———. 1937. Tree fork and steel tape for close measurement of small diameters. Jour. Forestry 35:654-60.

E. A. HEBB,
Southern Forest Experiment Station.

Aluminum Foil Replaces Tree Blazes

Aluminum foil is forging its way into the woods as a good substitute for tree blazes. Small pieces are being tacked or stapled to trees where blazes might formerly have been placed. No longer need there be confusion over a multitude of blazes that seem to lead everywhere.

The foil's main advantage over blazes is the fact that it can be changed at will. A preliminary road location marked with aluminum tags can easily be taken up and moved if a more desirable location is found, but a blazed line cannot. Likewise, any other temporarily marked line can be erased to avoid later confusion merely by removing the tags.

The foil can be cut into small pieces to fit into the pockets of field clothes. Pieces about 4 inches square are commonly used for most purposes. The aluminum is almost as light as paper and can be cut with scissors or paper cutters; four or five thicknesses can be cut at the same time.

Different shapes can be cut for different purposes within the same area. On one forest square tags were stapled to trees to mark a property line. Hung by one corner, the square tags became diamond shaped and then were used to mark the cutting line for the loggers. References to a section corner were written on the foil tags every five chains. Since the writing was done by indentation, a nail worked about as well as a pencil.

A triangular piece (6 inches square, cut diagonally) made a good marker for road location work. A preliminary road location line was run with an abney level by one man quite easily by using these tags. He placed the long diagonal side on top at the grade line. From his initial tag he went and sighted back to obtain his desired grade location. When he had obtained the second point, he marked the grade line with another triangular tag on a tree and proceeded by sighting back on that tag.

The aluminum foil for the first year or two reflects light and usually shows up more plainly than do blazes. However, in the dark woods it can be difficult to see if tacked against a tree of light colored bark. It is always best to wrinkle the tag and twist a corner to reflect the light from the nearest opening.

The tags can be tacked up very easily and quickly with a stapling hammer, using ½-inch staples. A stapler similar to that used to fasten crate tops can fasten many tags with one filling. If only a few tags are to be hung, it reduces the weight to carry shingle nails to tack them to the trees with a small hammer or a small rock. A longer nail might be needed for a permanent marker. Although nails

are a hindrance to sawing the logs in the future, the aluminum staples and tags do not bother the saw.

In long-lived, pitch-bearing trees, a blaze is much better for a permanent mark. In such trees a blaze may grow over so that only sharp eyes can find the outer evidence, but the blaze will last as long as the tree. Many a witness tree has been chopped out for evidence of a section corner more than sixty years after the original survey.

Although aluminum will last a long time, a growing tree may push off a tag attached to its outer surface. Animals will also exact their toll. Elk have been attracted by the shining objects and have rubbed them off with their antlers. Bears also have pulled some down. Even woodpeckers have found pleasure in puncturing them full of holes.

For a permanently marked line, blazes are best; but for a location that is needed for only a few years aluminum foil is excellent.

CARL L. HAWKINS,
U. S. Forest Service,
Corvallis, Oreg.

Report on A Christmas Tree Thinning Operation

For several years foresters have discussed income possibilities from Christmas tree sales in young plantations. The following report is based on an actual case record from a plantation at the Branch Experiment Station of the University of Wisconsin at Hancock, Wis., which was established by Dr. S. A. Wilde of the Soils Department in cooperation with the Wisconsin Conservation Department.

The plantation was established in the spring of 1938 with 2-2 red pine stock at a spacing of 4 by 4 feet or 2,722 trees per acre. Survival was 90 percent ten years after planting which left 2,450 trees per acre. In December 1949, a thinning was made for Christmas tree sale which removed 525 trees per acre and left 1,925 trees per acre.

An analysis of the financial summary shows the following:

Cost of planting stock (1938)—2,722 trees @ $5/M	$13.61
Labor cost of planting—2,722 trees @ $5/M	13.61
Land cost	3.00
Total investment	$30.22
Investment plus 3 percent compound interest for 12 years $30.22 × 1.426	$43.09
Taxes @ 20¢ per acre per year plus 3 percent compound interest 20¢ × 14.19	2.84
Costs of cutting trees—10 hrs. @ 90¢ per hr.	9.00
Trucking costs—525 trees @ 5¢ per tree	26.25
Total costs	$81.18
Income	
525 trees @ 40¢ per tree	$210.00
Land value—$3.00 per acre	3.00
Total income	$213.00
Profit	
Income minus expenses	$213.00 − $81.18 = $131.82
Income per acre per year	$131.82 / 12 = $10.99

No value has been assigned to the 1,925 trees per acre which have been left, yet the income from sale of Christmas trees has liquidated all costs plus 3 percent compound interest and has returned a sizeable profit. Income from future cuttings which will be designed to yield Christmas trees from tops, fence posts for treatment, pulpwood, and eventually lumber, will not have to bear the onerous burden of compounding interest. In the analysis of returns from this plantation in future years and in the determination of net worth the question might properly be raised as to whether the profit from this plantation should be carried forward on the credit side of the forest ledger and compounded at 3 percent interest as original planting and land costs have been carried on the debit side since the plantation was established. Certainly it would seem logical so to consider it.

It is only in the last two years that red pine has found a ready market for Christmas tree use in Wisconsin, but in that time it has become a very popular tree for such use. While it is true that there may be a market limitation for Christmas tree sales, it is probable that locally produced trees will have a distinct advantage over trees shipped from long distances both from the standpoint of freshness of product and competitive pricing. If plantation costs can be liquidated and a net profit shown in a few years after planting, foresters would be well advised to try closer spacings on plantations where local markets offer possibilities for Christmas tree sales.

R. W. ABBOTT,
University of Wisconsin.

We Present

John William B. Sisam

Forestry is no academic profession but its future will depend much on the kind of training given to young foresters by our universities. In Canada the enrollment of student foresters has increased so sharply that the number receiving degrees since 1945 will soon exceed the total graduated before that time. As the four schools of forestry grow, debate about their function increases. Should the embryo forester be broadly educated and how soon can he afford to specialize? Should the main object be to encourage the development of his ability to work out problems for himself or to instruct him in the present accepted techniques of forestry? Should the emphasis be laid on underlying principles or specific application, on the fundamentals of forestry science or on forestry practice?

John William Bernard Sisam, dean of the Faculty of Forestry at Toronto, does not have much difficulty in making up his mind about these questions. Although he is a comparatively young man, he has had a wide experience and knows that forestry will not be advanced by men with narrow training. He believes that the undergraduate must learn the fundamentals of the sciences on which the practice of forestry is based and at the same time be given as much opportunity as possible to get a liberal education. He must have something besides technical knowledge, and above all the ability to think straight and to express himself. To encourage the practice of more effective writing and speech should be one of the objectives of all university courses.

The undergraduate who focuses his attention too soon on a narrow field may climb to a pinnacle, but it is apt to be one where he can "see little but his own feet". Sisam wants him to have his feet on the ground and at the same time know the ground on which he stands. Specialization is necessary but it can start too soon. The time for it is after graduation. The Dean at Toronto thinks that there must be more post-graduate study in forestry and this means more research work by the universities. The practice of forestry may be an art or even a business, but it must

Photo by Ashley & Crippen

JOHN WILLIAM B. SISAM

be based on the spirit of research, on an understanding of the methods of critical analysis and experimentation which characterize scientific work.

Dean Sisam's approach to the expanding responsibilities of forestry schools in Canada is based on a career which has brought him in touch with many aspects of forestry problems both in Canada and in other parts of the world. He had the initial advantage of being born in the Maritime Provinces, which are noted for their exports of wood products and brains. This event took place in Springhill, Nova Scotia, on May 22, 1906. After attending the Provincial Normal School at Fredericton, N. B., he decided he wanted to work in the woods and became a student in the Department of Forestry at the University of New Brunswick. Obtaining his B.S.F. there in 1931, he later studied at Yale University and was awarded the M.F. degree, *magna cum laude*, in 1937. He is still a student, as anyone will testify who has been with him in the woods and seen him pondering a silvicultural problem with a concentration that must have baffled many blackflies.

For eight years he worked with the Dominion Forest Service in the Maritimes, Quebec, and Ontario, mainly on research projects of a biological or silvicultural nature. In 1939 he was appointed Deputy Director of the Imperial Forestry Bureau at Oxford, England. The main purpose of the bureau is to supply information to foresters in the many parts of the British Commonwealth, particularly those parts which still have colonial status and are somewhat isolated from libraries and do not have close contact with other sources of information. One of his first responsibilities was to complete the organization of staff to produce *Forestry Abstracts*. This publication rapidly became one of the most effective journals of its kind. It is an invaluable digest of current literature, complete, concise, and at the same time readable. It meets the forester's need for a means of keeping in touch with the ever-growing accumulation of scientific publications in a multitude of journals using different languages. The British seem to have a genius for distilling the essence from prolixity. In Sisam they found a man who knew how to get this work done, although he prefers to give credit to the competence of his colleagues on the staff.

War broke out shortly after Sisam took up his duties in England and the first issue of *Forestry Abstracts* was going to press. It is indicative of the strategic impor-

tance of wood supply to Britain that is was decided to maintain the work of the bureau and, while the work of abstracting and providing information on forestry continued, particular attention was paid to the question of timber resources available to the Commonwealth and their place in the economic aspects of war. The experience of two world wars has underlined Britain's dependence on external sources of softwood and the fact that Canada is the chief source within the Commonwealth of Nations.

In spite of the difficulties of war conditions, the work of the Commonwealth Forestry Bureau, as it is now called, was developed during Sisam's directorship, particularly as an aid in providing a background for research. Technical communications were published, both in the Abstracts and separately, which summarized the latest advances in the solution of problems of general and immediate importance. These were sometimes the result of collaboration with other Commonwealth Bureaux as in the case of the control and use of *Imperata cylindrica*, a grass which is a common weed particularly in India and the East Indies. Other subjects treated were the uses of producer gas, forest cooperatives in forest management, and forestry credit—to illustrate their diversity. Two recent papers by Sisam have been published by the Commonwealth Agricultural Bureaux. One deals with the use of aerial surveys in forestry and agriculture throughout the world, including Russia; the other with the establishment of vegetation on industrial waste land, a problem of particular interest in Great Britain and South Africa where the reclamation of land spoiled by mining is a matter of concern. The bureau is ready to provide foresters in any part of the world with a picture of the work done on any subject and put them in touch with leading men in a particular field. Since returning to Canada, Sisam has acted as official correspondent of the bureau in this country and wants to see its possibilities more widely recognized.

Sisam is known to his forester friends as "Bernie" and a man who can be counted on to play his part in promoting the ideals of the profession. He is associate editor on world forestry for the JOURNAL OF FORESTRY, a member of the Associate Committee on Forestry of the National Research Council of Canada, and chairman of the Advisory Committee on Forestry of the Research Council of Ontario, the Canadian Forestry Association of Ontario, and the Southern Ontario Section of the Canadian Society of Forest Engineers. He always pulls his oar in the boat, for he is a worker, but in spite of his many duties finds plenty of time for the social side of life. The accompanying photograph gives a hint of his physical advantages for this. His tall frame is an ornament to any occasion, whether it be convivial or dignified, and his *savoir faire* can be counted on at a students' smoker, or a Chancellor's reception. This lanky build gives him a great advantage which, as a student, he exercised to the full in such games as badminton and tennis, and he can still be seen driving a long if sometimes misdirected golf ball. Rumor has it, however, that his two young sons are beginning to challenge him in games of strength and skill.

For Bernie Sisam is a man of parts. Canadian foresters are glad to see him back in his native country, for his own sake and because of the job they know he can do for forestry in his present position.

R. E. BALCH.

Points of View

Federal Participation Means Federal Regulation

As the Society membership is to vote upon the petition of September 24, 1949, it seems to me highly desirable that our members understand clearly just what they are voting for or against. In my opinion, the issues have never been too clearly stated. They are often obscured by the emotional arguments which appear in the JOURNAL or are heard in debates on the subject of federal regulation of forest practices on private lands.

The petition directly associates this vote with the Anderson Bill, S.1820, now before Congress. Except for the timing it might as well have been the Pierce, Hook, or Walgren Bills of other years. The broad principles have been the same in all of them.

So let's examine the Anderson bill in detail:

All the basic authority is vested in the Secretary of Agriculture.

It is true that "*insofar as practicable*" he is to exercise this power "through cooperation with the states," but he is the sole judge of what may or may not be "practicable," and there is no real appeal from his decisions. Such appeal as is provided may be heard before other public officials appointed by the administration in control of the government at the time the appeal is heard, but they, as well as the Secretary of Agriculture, are political appointees with no first hand knowledge or experience with the problems which may be involved. Appeals which may be taken to court are so restricted as to be valueless.

Therefore the forest landowner has no real protection under the law or based upon equity from decisions, rules, and regulations which may be imposed upon him.

Under Section 4. The Secretary *may* "obtain the cooperation of state and local agencies," but he is also empowered to act "directly" with forest operators and other agencies as he may see fit and under "such conditions as he may deem necessary."

This is a tremendous power to place in the hands of a politician.

Under Section 5. The National Forestry Board is to be appointed by the Secretary. It, therefore, will be a political board consisting of individuals friendly toward or indebted to the national administration. Its composition is so designated in the act that a majority of its members will have no technical knowledge or experience in forestry matters. It need not have a single graduate forester among its members.

Under Section 6. The Secretary could refrain from approving any state plan or any state laws that are not to his taste and punish that state under *Section 7* by withdrawing any federal assistance the state may be receiving "under this Act or any other Act."

This again is almost unlimited power to dictate and control state actions. It may be imposed at the will of one man.

This also means that the federal dollars spent on conservation in any state are at best only 75 cent or 90 cent dollars. The remainder of these dollars must be spent for federal bureaucratic administration, inspection, and supervision.

This is not true when the dollars are contributed through state taxation and administered directly by the state.

Section 9 gives the secretary power to dictate the detailed management of all private forest properties. In the Douglas-fir region every operator or owner would have to secure *in advance* a permit to clearcut any 40 acres he might desire to operate on. One can only imagine the paper work and operative delays this would cause, the tremendous office personnel it would require.

Under Section 10. Can you imagine all of the intensively managed forest properties in the United States having to submit their technical plans of management to the Secretary? The endless correspondence and hearings? The multitude of federal employees required to administer this act?

Under Section 11. Any appeals to a district court from rulings by the Secretary are confined to a "*transcript of the record*" and "findings of fact by the Secretary."

The Secretary can, of course, see that such transcript and findings of fact are favorable to his side of the case. This provides no legal protection of property rights.

Under Section 12. The Secretary may compel any forest landowner to keep any records he may require, submit any reports he may require, and to open these business records to the inspection of federal officials who may wish to see them.

Under Sections 13 and 14. Any owner or operator who may have wittingly or unwittingly broken some of the rules and regulations is forbidden to move or dispose of any of his forest products.

If he does he may be criminally prosecuted by the federal government or have his operations shut down by a court order.

After carefully reading this bill one must make up his mind whether it is an innocuous measure to provide for satisfactory minimum forest practices or an act to give the federal government absolute control over all private forest lands and control of state forestry departments.

A vote for this type of federal regulation is most decidedly a vote against state regulation of private forest cutting practices. The states would be directly under federal controls and could be forced to adopt any policy promulgated by the Secretary of Agriculture.

It would also kill any individual initiative in private forest management as all forestry plans would be subject to the approval of the Secretary of Agriculture and would have to be submitted to him for such approval.

CLYDE MARTIN.
Tacoma, Wash.

Arboriculture Articles Needed

Since my work is along the lines of arboriculture work, I am speaking for others like myself. Many of us are members of the Society of American Foresters for purely sentimental reasons. We continue to pay our dues even if we feel that we receive no benefits therefrom. We prefer other organizations because we really do get a great many benefits from them.

My suggestion is therefore,—why not devote say 25 percent of the space you ordinarily allot for the various articles to some subjects which will be of greater interest to foresters in private arboriculture, municipal shade tree work, or even park work? After all, we're foresters who have branched out into this line of work. I believe that after a few issues with articles such as this, the JOURNAL will find that there will be greater interest shown by a certain class of members who have been more or less inactive, and eventually many more of the forestry alumni will start to return to the fold.

The men who have entered the arboriculture field have been in the past considered as the black sheep of the family of foresters. After all, we all had the same, let us say, "pre-forestry" training. We just took the other branch when we arrived at the fork in the road.

As far as the kind of articles I would suggest: we are interested in trees, not as a mass, but as individuals. Therefore, anything along those lines, would be of interest to us. For instance, we are interested in trying to find new tree varieties which would better withstand city conditions without having some of the undesirable traits which those we now have possess. For instance, elms without buttressed roots, and other trees which will maintain a definite size and shape, after reaching maturity.

Another subject of interest—tree pathology, especially on some such diseases as the much discussed Dutch elm disease, phloem necrosis, oak wilt, plane tree disease, etc.

How about plant entomology? The Japanese beetle, elm leaf beetle, scolytus beetle, and many others, hold our attention.

There are other subjects in which we are interested, such as the development of new spraying chemicals for various purposes, machinery to do some of our work; sprayers, mist blowers, chain saws, etc., the use of the various kind of chemicals as fertilizers and new methods of application, and treating diseases of trees by injection.

I think that there is a wider field in arboriculture research than there is in forestry research because there is so much to be learned that we do not know. The reports of this research would prove invaluable as material for the JOURNAL.

FRANK E. KARPICK,
Department of Parks,
City of Buffalo, N. Y.

Comments on The Journal's "New Look"

When the January JOURNAL hit my desk, I was amazed to note the pleasant changes which have taken place in the format and general appearance. The "magazine cover" surely helps make a more attractive JOURNAL. Congratulations for the fine work you have done to bring about these much-needed changes and improvements.

J. H. KITCHENS, JR.
Louisiana Forestry Commission.

I am very much pleased with the new appearance of it. Ordinarily I glance through the JOURNAL and think that I will read it thoroughly later, which I seldom do. This morning I find myself letting the mail pile up and reading the JOURNAL from cover to cover.

KENDRICK BURNS,
L. D. Warren Company,
Cumberland Mills, Maine.

The January issue of the JOURNAL was a very pleasant surprise. The new look is well done and attractive. A little life has been given to it that I am sure all members will appreciate.

R. C. FRAUNBERGER,
Southeastern Industries, Inc.

The new make-up of the JOURNAL strikes me as being just fine. Why didn't we do it long ago? Possibly, however, it was the interesting content of the January issue that made it seem so good. Or a combination of format and content. Congratulations.

E. W. LOVERIDGE,
U. S. Forest Service.

I cannot refrain from saying that it reflects a lot of improvement and forethought. The new format offers greater flexibility for inclusion of graphs, tables, and illustrative material which are essential to the proper presentation of many technical articles. I like, also, the new cover policy whereon appropriate photographs will apparently be used. This provides a medium for recognizing various forestry interests in an impartial way. I can assure you that the publication policy was warmly received by those of the forestry staff with whom I have talked at Colorado A & M College.

LEE E. YEAGER,
Colorado A & M College.

I want to congratulate you on the new format of the JOURNAL. I sincerely believe that it is another step ahead in making our publication a more attractive as well as an increasingly useful one.

RALPH G. UNGER,
New York State College of Forestry.

May I extend my congratulations on the new form and presentation of the JOURNAL. It is indeed attractive, and furthermore, easy to read. There is, however, one constructive suggestion or criticism that I would like to make of it and that is that the JOURNAL is bound in a white cover. We older members of the Society have been used to the green covered JOURNAL which has made it stand out individually and distinctly in comparison when other periodicals are involved. Since the JOURNAL is purposely a professional and scientific journal, I believe it should have a more characteristic cover. The new January cover now gives it the appearance, in my estimation, of a weekly magazine. I would like to see a more distinctive and dignified professional look.

E. B. MCGRAW,
Ontario Paper Co., Ltd.,
Thorold, Ontario.

I sure like the new JOURNAL. It is a real attractive magazine now—modern, interesting. Congratulations to all who had a hand in the change.

F. W. GODDEN,
Ogden, Utah.

The Puget Sound Section, at its February, 1950 meeting voted unanimously in favor of the JOURNAL's new look. The Section endorses the changes in size, the advertisements, etc., and hopes that the future editorial policy will be realistic.

WILLIAM A. TINNEY,
Secretary-Treasurer,
Puget Sound Section.

The new JOURNAL OF FORESTRY is a great success at the College of Forestry. Our library copy is being used almost constantly by the students, so that we're beginning to wonder if there will be anything left for binding at the end of the year. The JOURNAL has always been used at least twice as much as any other one of our 40 periodicals displayed in the library, but there is a greater demand for it with the appearance of the present volume. The students highly approve the format, the articles, and the advertising. Several of them have inquired about subscription rates and have shown a much greater interest in securing their own copies.

MRS. ELIZABETH K. MENZIES,
Librarian,
College of Forestry,
University of Washington.

Reviews

ABC's of Photogrammetry. Part I. Fundamentals. Part II. Tilt and Control Extention.

Part I by Gomer T. McNeil. 127 pp. Illus. Part II by Ralph O. Anderson. 157 pp. Illus. Offset-printed by Edwards Brothers, Inc. Ann Arbor, Michigan. 1949. $3 per part.

This book represents an effort to provide the much needed elementory introduction to photogrammetry, an effort which is only partly successful as the clarity of the presentation is counterbalanced by the limited scope of the work and the unattractiveness of the format.

The two parts are offset-printed from typewritten copy, Part I being written with elite type and Part II with the standard pica type. The pages are one-half the size of the standard typewriter sheet, and are thus smaller than those of the standard 6 by 9 inch book. Inexpensiveness in printing has thus been obtained at the expense of loss of attractiveness and readability. The pages are not numbered consecutively, but are rather numbered separately for each chapter.

The authors are members of the photogrammetry department of the U. S. Naval Interpretation Center, but the work presents the private views of the writers.

Part I deals primarily with the basic geometry of the photograph, particularly of the vertical air photograph. The photographic mission and stereo-vision are dealt with briefly, but mapping instruments and techniques are largely omitted. Mr. McNeil concentrates on the mathematics of aerial photographs on the argument that an understanding of this is an essential perquisite to the photogrammetrist.

In Part II, Anderson ably summarizes his own techniques of tilt analysis and control extension. He presents a step by step procedure whereby measurements are entered on prepared computation sheets to determine the degree and axis of photograph tilt. For the theory and proof, the reader is referred to earlier work of the writer. Of particular interest to the forester are remarks dealing with techniques used by the T.V.A. and A.A.A. in determining the acreage of fields and in the mathematical solution of other land use problems.

The discussion in both parts is clear and concise, but is generally suited for the man who intends to go ahead and master more complex photogrammetric techniques and procedures. The forester or other casual user of photographs is apt to be confused by this treatise on the fundamentals of photogrammetry which covers aspects of photographic analysis not usually required in his work, and which omits a consideration of the rapid and simple photogrammetric techniques that he normally employs.

STEPHEN H. SPURR,
Harvard Forest,
Harvard University

The Natural Vegetation of the Windward and Leeward Islands.

By J. S. Beard. Oxford Forestry Memoirs No. 21, 1948. 192 Illus. Oxford University Press, London. 1949.

The Windward and Leeward Islands include 23 principal islands or groups lying between the Virgin Islands and South America at the eastern end of the Caribbean Sea. Their aggregate land area is about 2,300 square miles. They are possessions of the British, French, and Dutch. Past agricultural development has removed the forests from the lowlands of most of these islands. The more accessible forests remaining are secondary and of poor quality. The lack of organized forest conservation, the growing need for forests to protect water supplies and to provide timber for the rapidly increasing population, and the growing concern for the welfare of colonial peoples throughout the world make very timely the appearance of *The Natural Vegetation of the Windward and Leeward Islands.*

In this work Dr. Beard brings together the results of some 8 years of ecological study undertaken largely during his recent service with the Trinidad Forest Department. The environmental factors are described in detail and the different plant communities are classified on a physiognomic basis. Following a description of the region as a whole the vegetation of each island is described in detail and related to the rest of the region. The tremendous volume of data presented regarding all important forest areas in these islands in the form of tabulations of numbers of trees per acre by species and girth classes, and excellent maps, profile diagrams, and photographs is of great permanent value. The author's supplementary observations and interpretations constitute an equally important contribution.

Comparative study showed the richest floras to be in the central islands, and indicated that there never has been a complete land bridge between the Greater Antilles and South America. Using floristic, geological, and faunistic evidence Dr. Beard presents the following theory regarding the origin of Lesser Antillean vegetation:

During Miocene time volcanic islands appeared in the vicinity of Guadeloupe, Dominica, Martinique, and St. Lucia. These were isolated in an open sea stretching from the Virgin Islands to Tobago. A few waif species of plants arrived. During the Pliocene regional uplift produced an extension of the Greater Antilles to the vicinity of Antigua. Considerable migration of species to Guadeloupe and thence southward took place. A low land appeared in the vicinity of Grenada and the Grenadines.

Some continental species crossed to it. The land-mass north of Guadeloupe foundered again in late Pliocene early Pleistocene time. During the Pleistocene, Montserrat, St. Kitts, Nevis, and St. Vincent were formed and were colonized from the central islands. Since Pleistocene time the islands have again risen. Barbados and Barbuda appeared and were colonized from the main arc. Antigua is possibly a relic of the Pliocene land; it existed as two islands during the Pleistocene which were subsequently united by uplift. The Anguilla St. Bart's group appear to have been land in early Pliocene time, but to have been under the sea later.

Dr. Beard's classification and nomenclature for the different plant formations are logical and should be generally accepted. His abandonment of the term "montane rain forest," used previously to designate a common formation above 1,500 feet elevation, was desirable. This forest grows in an environment, which, because of excessive precipitation and exposure to the wind, conducive to physiological drought and is very different from the near-optimum generally associated with rain forest. The new term used, "montane thicket," apparently describes most of the stands of the Lesser Antilles well.

Most of the plant formations of the Lesser Antilles also developed in nearby Puerto Rico but a few minor differences are evident. The *Dacryodes-Sloanea* association, or "lower montane rain forest," is characterized by three tree stories instead of two, as described for the Lesser Antilles. The difference is primarily in the general canopy level, which is lower than in the Lesser Antilles, setting off a discontinuous emergent story above. Another difference is in the occurrence of palm brake in the mountains, which Dr. Beard found always on sites severely exposed to the wind. In Puerto Rico this formation develops along stream banks and on former landslide areas almost regardless of exposure. Instability of the soil, also mentioned by Dr. Beard, is more closely related to palm occurrence in Puerto Rico than is exposure.

The Natural Vegetation of the Windward and Leeward Islands lays the foundation for progress in at least three directions: (1) forest conservation, based upon the data as to the location and character of important forest areas within each island; (2) further regional ecological research, using the universal classification of climax vegetation; and (3) local ecological research, based upon the detailed descriptions of the climax formations of each island. It is a basic reference for all plant scientists interested in the West Indies.

FRANK H. WADSWORTH,
Tropical Forest Experiment Station, Rio Piedras, P. R.

The Maple Sugar Book.

By Helen and Scott Nearing. 271 pp. John Day Company. New York.

Vermont is the first state in the union in volume of maple sirup produced. It is quite logical that the first book to be published in the United States covering this farm enterprise should also be from Vermont.

The past, present, and future would be an appropriate way to characterize the three parts into which the book is divided.

In dealing with the past a very complete picture of sugaring as carried on by the Indians (our first maple sugar makers) and the early settlers of colonial times is set forth. Only persons with the time, the intellectual curiosity, the know-how of historical research and writing, such as the Nearings have, could possibly have unearthed such a wealth of facts, and put them together so effectively. It was a job that needed doing and the Nearings are to be congratulated for the comprehensive summary they have given.

It is too bad their research did not take them outside New England, for after all the sugar maple is not confined to New England, and the province of Quebec in Canada. For example, in *Land of the Crooked Tree*, U. P. Hedrick in describing his boyhood in pioneer Michigan gives us one of the most delightful pictures of sugaring that it has been the privilege of this reviewer to read. Similar records in New York, Ohio, and Pennsylvania are no doubt also gathering dust.

Part II sets forth in logical manner the whole business of maple sirup and sugar making as carried on today. Starting with the management of the sugar bush itself (a forester couldn't have written it better), one is led through six readable chapters to the climax in the marketing of the finished product. The basis for these chapters is the Nearings' own experiences for the past eighteen years in operating a sugar bush of no mean proportions, 3,250 buckets.

Where they have gone into detail and described their own particular techniques and improvements, they have definitely made a most worthwhile contribution to the literature of maple sirup farming. Especially noteworthy are the details regarding (1) labor saving technique in bucket and cover distribution in the spring, (2) the development of a piping system for delivering the sap down hill, and (3) the designing and developing of an up-to-date sap house, including a concrete chimney.

The climax of Part II is without question the chapter on marketing in which the Nearings have very generously shared the secrets of their success in being merchants as well as processers.

The references which the authors constantly bring in (I am tempted to say drag in) in support of accepted practices throughout this section, distract from, rather than add to, the reader's interest. The majority of these references bear dates prior to 1900 and the uninformed would gain the impression that the industry had been more or less static in this present century. As a matter of fact there have been greater advances made in the whole field of maple sirup farming since 1900, than in any other equal time span of the past.

In Part III, dealing with the future, the Nearings have surely made a good case for sugaring as a way of life, if one is going to be content with part time farming. This section should have real appeal to former city dwellers like

the Nearings, who want to get away from the urban life, and have the intestinal fortitude which "sugaring" takes, as the authors are at some pains to emphasize.

It must be borne in mind, however, that fully 99 percent of the sap harvested and processed annually in these United States is done by farmers, mostly dairy farmers, who integrate sugaring with other farm enterprises. These farmers can in the long run produce sirup more cheaply, because they have on tap, labor, power, and facilities on a year round basis, and only a fraction of these annual costs have to be absorbed by the maple sirup business.

J. A. COPP,
Professor of Forestry,
Cornell University.

Some References on Watershed Management.

By W. E. Bullard. 25 pp. Research Note No. 63. Pacific Northwest Forest & Range Experiment Sta., Portland, Ore. 1950.

This modestly titled research note should be required reading for all those charged with management of forest and range watersheds. It was written to provide administrative officers of the U. S. Forest Service in the Pacific Northwest with a summary of available information on watershed management. In meeting this objective, the author has written a paper which will appeal to a much wider audience than the one for which it was originally intended.

In the words of the author, "The paper is divided into six parts: First, the general field of forest influences which considers the effects of forest vegetation (trees, shrubs, herbs, and grass) on climate, soil, erosion, runoff, and streamflow. Second, the watershed management aspect, dealing with such things as logging systems, logging methods, use of fire, road location, and construction. Third, the details of specific activities often necessary in watershed management, such as road drainage, road bank stabilization, gully control, and curative measures for eroding 'sore spots.' Fourth, local observations and some recommendations applicable to our conditions. Fifth, a tabulation of the water yields of some of our principal streams, to give a picture of the size of the water crop. Sixth, a list of references for those who want to dig a little deeper."

The excellent review in the first part presents in a readable style the most important findings in the field of forest influences. The second section dealing with the effect of logging, grazing, road construction, fire and soil condition on streamflow emphasizes the watershed management aspects. The third and fourth sections should be of particular interest to those who favor watershed management in principle, but often wonder just what it means, or how to go about it. These readers will find many practical suggestions on how logging practices and road construction can be tied to watershed management. The fifth section gives an indication of the size of the water crop produced from national forests in the region. The paper concludes with suggestions for further reading and a lengthy bibliography covering source material.

H. W. LULL,
U. S. Forest Service.

Boden und Wald (Soil and Forest).

By V. T. Aaltonen. 457 pp. Paul Parey, Berlin and Hamburg, Germany, 1948. D. M. 24.

This book is a translation of the Finnish text, *Metsämaa* (*Forest Soils*), originally published in 1937, and later revised and enlarged. The author, Professor of Soil Science and member of the Forest Research Institute in Helsinki, is an investigator of long standing who has many creditable original works to his name.

The subject matter is divided into four parts: (1) review of ecological aspects of northern Europe, including geology, climate, soil-forming processes, soil types, and forest types; (2) effect of the forest on physical, chemical, and biological properties of soil; (3) productivity of forest soils as influenced by physical properties, mineral nutrients, humus, microorganisms, soil reaction, and environmental changes; (4) soils and silviculture, comprising competition of trees for living space, effect of silvicultural measures on the state of soil fertility, and use of fertilizers. The second and third parts of the book, dealing with forest influences and factors affecting productivity of forest soils, are of universal interest; the first and last parts, concerned with the forests of Fenno-Scandia, should be particularly valuable to American and Canadian silviculturists working in the region affected by podzolization.

The outstanding feature of Dr. Aaltonen's work is its complete objectivity. It reports the results of investigators throughout the world strictly at their face value. At times a less scrupulous reader might wish for a few flicks of a critical whip over the shoulders of some overzealous authors. A simple comparison of results reported by different research workers brings clearly to light the fact that literature on forest soils is contaminated by a good many "incorrect interpretations of poorly conducted experiments." On a few occasions Aaltonen expresses regrets at the existing state of affairs. Such regrets are particularly concerned with the present confusion in humus classification, absence of uniformity in analytical methods used by different investigators, and publication of hypothetical statements that lack a sound statistical foundation.

The book is dedicated to A. K. Cajander and contains an introduction by J. Köstler who states, "Aaltonen's work signifies an outstanding contribution which enriches the scientific foundations of silviculture." The reviewer warmly seconds this statement. A comprehensive bibliography of about 750 references includes a good share of American works.

S. A. WILDE,
Professor of Soils,
University of Wisconsin.

Current Literature

Compiled by MARTHA MEELIG, *Librarian The New York State College of Forestry*

Range Management Section Compiled by FRANCIS FLICK, *Library, U. S. Department of Agriculture*

General

4-H Leaders' Guide to Projects in Forestry and Wildlife Conservation. By A. N. Lentz. 9 pp. College of Agric., Rutgers Univ., New Brunswick, N. J. 1949.

Loblolly Pine Bibliography. Comp. by K. W. Dorman and I. H. Sims. 65 pp. Southeastern Forest Expt. Sta., Asheville, N. C. Station Paper No. 6. 1949.

State Control of Private Forestry Under European Democracies: A Survey of Developments in Eight Countries of Western Europe in the Decade 1938-1948. By M. L. Anderson. 112 pp. Clarendon Press, Oxford, England. Oxford Forestry Memoirs. No. 22. 1950.

When You Are in the Woods. By Fay Welch. 60 pp. Cartoon illus. New York State College of Forestry, Syracuse 10. 1950. Single copy free.

Young Bush Pilot. By Jack Hambleton. 200 pp. Illus. by Thorcau MacDonald. Longmans, Green & Co., Toronto. 1949. $2.75.

Conservation

Using Our Tree Crop Wisely. 15 pp. Illus. Southern Pulpwood Conservation Assoc., Atlanta, Ga.

Farm Forestry

Growing Black Locust in New Jersey. By A. N. Leitz. 4 pp. Illus. Extension Serv., College of Agric., Rutgers Univ., New Brunswick, N. J. Leaflet No. 32. 1949.

Growing Christmas Trees in New Jersey. By A. N. Lentz. 8 pp. Illus. Extension Serv., College of Agric., Rutgers Univ., New Brunswick, N. J. Leaflet No. 30. 1949.

Marketing Woodlot Products in the State of Washington. By J. W. Allen. 61 pp. Inst. of Forest Products, Univ. of Washington, Seattle 5. Bul. No. 1. 1950.

Forest Influences

Statistical Control in Hydrologic Forecasting. By H. G. Wilm. 29 pp. Pacific Northwest Forest and Range Expt. Sta., Portland, Ore. Research Notes No. 61 Mimeog. 1950.

Forest Management

A Comparative Analysis of Standard Cord and Cubic Foot Volumes of Timber in Georgia for the years 1936 and 1946. By A. E. Patterson. 15 pp. George Foster Peabody School of Forestry, Univ. of Georgia, Athens. Bul. No. 2. 1950.

Forest Products

Minor Forest Products of the Pacific Northwest. By E. W. Shaw. 10 pp. Pacific Northwest Forest and Range Expt. Sta., Portland, Ore. Research Notes No. 59. Mimeog. 1949.

Forest Resources

Production of Lumber in Oregon and Washington 1869-1948. By F. L. Moravets. 12 pp. Pacific Northwest Forest and Range Expt. Sta., Portland, Ore. Forest Survey Rept. No. 100. 1949.

Protection

Insect Enemies of Eastern Forests. By F. C. Craighead. 679 pp. Illus. U. S. Dept. of Agric., Washington 25, D. C. Misc. Publ. No. 657. U. S. Govt. Print. Off. 1950. $2.50.

Range Management

First year Effects of Logging on Forage Production. By G. A. Garrison and R. S. Rummell. 5 pp. U. S. Forest Serv., Pacific Northwest Forest and Range Expt. Sta., Portland, Oreg. Research Note No. 62. 1950.

Grasses and Legumes for Soil Conservation in the Pacific Northwest. By A. L. Hafenrichter and L. A. Mullen. 56 pp. Illus. U. S. Dept. of Agric. Miscellaneous Pub. No. 678. U. S. Govt. Print. Off. 1949. 20 cents.

Poisonous Range Plants of Texas. By A. H. Walker. 2 pp. Tex. Agric and Mechan. College, College Station. Extension Leaflet No. 1 114. 1949.

Presenting Both Sides of the Forest Grazing Controversy. By R. Partridge. 6 pp. Wyo. Range Mgt., Laramie. No. 17. Mimeog. 1949.

Range Condition; a Classification of the Grass-Sagebrush Range in the Yellowstone Soil Conservation District (Idaho). By R. L. Shipley and G. W. Thomas. 6 pp. U. S. Soil Conserv., Pacific Coast Reg., Portland, Oreg. 1949. (Similar pubs. for Aspen Range and Meadow Range.)

The Santa Rita Experimental Range. By M. Culley. 13 pp. Illus. U. S. Forest Serv., Southwestern Forest and Range Expt. Sta., Tucson, Ariz. 1949.

Silvics and Silviculture

The Advantages of Cleaning Coniferous Plantations When Competing Vegetation is Leafless. (Project M.302). 2 pp. Dominion Forest Serv., Ottawa. Silv. Leaflet No. 36. 1949.

The Development of the Spruce-Balsam Type in the Alcza Lake Experimental Forest. By A. R. Fraser and J. L. Alexander. 41 pp. Illus. British Columbia Forest Serv., Victoria. Tec. Publ. No. T.32. 1949. 25 cents.

Direct Seeding Experiments in the Southern Coastal Region of British Columbia 1923-1949. By E. H. Garman and A. L. Orr-Ewing. 45 pp. Illus. British Columbia Forest Serv., Victoria. Tec. Publ. No. T.31. 1949. 25 cents.

Direct Seeding With Red Pine in Central New Brunswick. (Project M.229). 2 pp. Dominion Forest Serv., Ottawa. Silv. Leaflet No. 35. 1949.

L'Ecologie des Eucalyptus; son Application au Maroc. By Andre Metro. 109 pp. Societe des Sciences Naturelles du Maroc, 11 Rue Victor Cousin (Ve), Paris. Memoires No. 49. Oct., 1949.

Establishing New Forests by Planting and Seeding. (Cover title—*Regeneration Problem Analysis*). By L. S. Minckler. 47 pp. Central States Forest Expt. Sta., Columbus 15, Ohio. 1949. Free.

Forest Development on the Goulais River Watershed, 1901-1946. By D. W. MacLean. 54 pp. Dominion Forest Serv., Ottawa. Silv. Research Note No. 94. 1949.

Improvement Cutting in Tolerant Hardwoods. By D. W. MacLean. 19 pp. Dominion Forest Serv., Ottawa. Silv. Research Note No. 95. 1949.

On the Viability of Populus Seeds. By Yoshio Sato. pp. 77-92. Reprinted from the Research Bulletins of the College Expt. Forests, College of Agric., Hokkaido Univ., Sapporo, Japan. Vol. XIV, No. 2. 1949.

Red Pine in New York . . . Papers Presented at the Winter Meeting of the New York Section, S.A.F., Albany, Dec. 9-10. (David B. Cook, Sect., N. Y. Conservation Dept., Albany 7). 1949. 25 cents.

Soils

A Program of Forest Soils Research for the Pacific Northwest. By R. F. Tarrant, 8 pp. Pacific Northwest Forest and Range Expt. Sta., Portland, Ore. Research Notes No. 60. Mimeog. 1949.

Soils of Wisconsin in Relation to Silviculture. By S. A. Wilde, F. G. Wilson and D. P. White. 171 pp. Illus. Wisconsin Conserv. Dept., Madison. Publ. No. 525-49. 1949. $1.00.

Wood Technology and Utilization

A Collection of Oregon Woods. By W. I. Woods. 31 pp. Oregon State College School of Forestry, Corvallis. Cir. No. 1. 1949.

Dielectric Properties of Douglas Fir at High Frequencies. By J. J. Wittkopf and M. D. Macdonald. 39 pp. Oregon State College Engineering Expt. Sta., Corvallis, Bul. No. 28. 1949. 40 cents.

Dielectric Properties of Ponderosa Pine at High Frequencies. By J. J. Wittkopf and M. D. Macdonald. 23 pp. Illus. Oregon State College Engineering Expt. Sta., Corvallis. Bul. No. 29. 1999. 40 cents.

Exploratory Studies on the Grinding of Use for Plastics Filler and Glue Ex Black Walnut Shell Flour and on its tender. By T. G. Zarger. 26 pp. TVA, Norris, Tenn. 1949.

Hardwood Requirements of the Illinois Coal Mining Industry for 1948. By C. S. Walters and D. A. Kulp. Illinois Agric. Expt. Sta., Urbana. Mimeog.

Wood Water Work. 47 pp. Illus. Paper Trade Journal, 15 West 47th St., New York 19.

Society Affairs

Compiled by ROBERT D. HOSTETTER, *Assistant Executive Secretary*

Officers and Members of the Council—1950-1951

CHARLES F. EVANS, *President*
2867 Piedmont Road
Atlanta, Ga.

CLARENCE S. HERR, *Vice President*
Woods Department,
Brown Company,
Berlin, N. H.

HENRY CLEPPER, *Executive Secretary*
825 Mills Building,
17th Street at Pennsylvania Avenue, N. W.
Washington 6, D. C.

FREDERICK H. BRUNDAGE,
3290 N. E. Irving Street,
Portland 12, Ore.

FRANK H. KAUFERT,
School of Forestry,
University of Minnesota,
St. Paul 1, Minn.

RICHARD E. MCARDLE,
Forest Service,
U. S. Department of Agriculture,
Washington 25, D. C.

D. B. DEMERITT,
Dead River Company,
6 State Street,
Bangor, Me.

C. OTTO LINDH,
U. S. Forest Service,
Post Office Building,
Albuquerque, N. M.

DEWITT NELSON,
Division of Forestry,
Department of Natural Resources,
Sacramento 14, Calif.

STANLEY G. FONTANNA,
State Department of Conservation,
Lansing 13, Mich.

GORDON D. MARCKWORTH,
College of Forestry,
University of Washington,
Seattle 4, Wash.

EARL PORTER,
Southern Kraft Division,
International Paper Company,
Mobile 9, Ala.

Committee Issues Tree Pest Leaflets

H. I. Baldwin, chairman of the New England Section's committee on tree pest leaflets, has announced that the committee has been authorized to issue new leaflets on several subjects. Beginning in 1935 a cooperative project has been carried on to provide forestry agencies in the New England Section and surrounding area with short, authoritative leaflets on insects, diseases, and other injurious agents affecting forest trees. Each leaflet is written by a specialist on that subject, and all follow a uniform outline.

Originally the leaflets in the series were published and distributed through the courtesy of the Massachusetts Forest and Park Association. Some wood using industries have offered to make loans to underwrite printing costs of the proposed leaflets which will eventually be repaid through the sale of leaflets. In addition, the New England Section allotted $50 to the project.

Following publication of the first 50 subjects, they were reprinted in a volume titled *Important Tree Pests of the Northeast*. Although the books are out of print now, most of the original subjects are still available in leaflet form. Prices are $10 per 1,000 copies or $1 per 100 copies, the minimum order. Leaflets should be ordered from H. I. Baldwin, Hillsboro, N. H. and checks should be made payable to L. W. Rathbun, treasurer. A revised edition of the book is planned for the fall of 1950.

The selection of subjects to be covered is based on a preferential vote of the agencies using the leaflets. Over 300,000 copies of the leaflets have been distributed by state forestry departments, associations, and similar organizations.

The publications are well suited to answering inquiries from the public and are valuable aids in educating people to recognize and report outbreaks of destructive pests while still in the incipient stage, according to the committee chairman. Members of the committee are H. I. Baldwin, chairman, L. W. Rathbun, R. C. Brown, J. R. Hansbrough, H. R. Pierson, P. M. Reed, and H. A. Reynolds.

Management Committee Prepares Guide

Recommendations designed to assist foresters in applying forest management practices have been formulated by the Allegheny Section's committee on forest management. Three economic levels of intensity of practices are recognized, and silvicultural measures deemed desirable at each level are described.

In addition to serving as a guide for foresters in the Allegheny Section, the report is expected to coordinate recommendations given to forest owners by professional foresters.

Torkel Holsoe is the chairman of the committee. Other members are A. L. Bennett, H. D. Bennett, Maynard H. Hench, John J. Mohr, Walter W. Simonds, and Glenn E. Smith.

The Central States Section is also working on a similar project.

Certificates Presented

Member certificates are presented by the Central States Section to all who are advanced to the Member grade from the Junior grade of Society membership. The certificates, with the recipient's name lettered on each, are ordered through the Society office. The cost of one dollar per certificate is paid by the Section.

Suitable for framing, the certificates give recognition to practicing foresters who have proved their competence.

Ozark Submits Photos

Photographs of 84 foresters were recently sent to the Society office by the Ozark Section for inclusion in the Pinchot Collection at the Library of Congress. Duplicate photographs of each forester were also submitted for filing with each member's record in the Society office.

Over 1,000 foresters are now represented in the collection at the Library of Congress.

Roster Included

Brief reports of the activities of other Sections as well as those of its own were presented in a recent issue of the Gulf States Section's newsletter. Meetings of its ten Chapters were also reported, and a roster of members in the Section was included, too.

President's Commission Asks Society's Stand

President Harry S. Truman's Water Resources Policy Commission on March 1, 1950 requested the Society of American Foresters to present recommendations concerning water-resources programs. Morris L. Cooke, chairman of the Commission, in a letter to Henry Clepper stated that he was writing "in the belief that your organization has a vital interest in the nation's water policy and that you may assist us by a full presentation on such aspects of the matter as you would want the Commission to consider in reaching the conclusions which it will report to the President."

On March 27, with the approval of President Charles F. Evans and Vice President C. S. Herr, Henry Clepper, executive secretary, transmitted the following statement to the Commission:

Water Resources Statement

The Society of American Foresters concurs with the Commission's view that "close relationship between proper handling of water and of soil must be constantly present in any consideration of water resource policy."

The Society's primary concerns are with forests and related wild lands. However, it fully appreciates that the same principles of soil and water conservation apply to all areas, and that basically the problems involved in stabilizing watersheds and in properly maintaining their functions as hydrologic units are the same for all types of land.

The Society has long recognized the role of watershed management in achieving better control over waterflow both with respect to reducing damages from flood waters and sedimentation and to improving water supplies. It has supported such legislation as the Weeks Law of 1911, the Clarke-McNary Law of 1924, and the McSweeney-McNary Act of 1928, all of which have as cardinal objectives the restoration, protection, and management of forests and related lands in the interest of improving the conditions of streamflow from headwater areas. The Omnibus Flood Control Act of 1936, which provides for watershed studies and improvements as part of a nation-wide attack on flood problems, is a far-reaching step in the direction of a unified attack upon our land and water problems.

In 1947 the members of the Society adopted the following policy on multiple-use of forest and other wild lands which bears directly on the watershed aspects of forest management:

Policy on Multiple Use

The Society subscribes to the principle of multiple use of forest and other wild lands, meaning by that a conscious effort to manage each unit of land for its highest sustained productivity. In some cases, this may mean utilization of an identical area for several purposes at the same time; in others, utilization of different parts of an administrative unit for different single or limited purposes. In all cases, the development of management policies and plans requires adequate recognition of all resources and benefits, with due consideration of the relative social and economic values of each resource present and of the effects of utilizing one resource upon the stability, value and appreciation of the others. More specifically:

1. Satisfactory conditions of soil, cover, and water flow are basic, and all forest lands, regardless of type or purpose of ownership, should be so managed and protected as to maintain fully those conditions;

2. Management policies, plans and practices governing the use of a principal resource, such as timber, should take into account and make specific provisions for all the resources capable of use or appreciation, not just the principal resource alone;

3. Methods of intensities of practice, as in timber harvesting, livestock and big game grazing, recreation, and road and trail construction, which may bring about soil instability or adversely affect runoff and streamflow conditions, should be modified or avoided;

4. Knowledge and skill in multiple use management are as yet inadequately developed. Research on different phases of wild land use should be more effectively coordinated on the same experimental areas, and the study of multiple use problems should be made an integral part of such research;

5. Foresters, as managers of wild lands, have a professional obligation to keep abreast of scientific findings on the characteristics and interrelations of forest resources, and of the effects of developing any one of them upon the others.

(Approved by letter ballot of the membership, December 13, 1947).

In stressing the importance of forested watersheds, we do not overlook the limitations of forest cover in restraining major floods such as occur in the larger valleys. We believe, however, that well maintained forest cover exercises an important function even in major floods in a number of ways such as by permitting the soil to exercise to a maximum its detention and storage functions, and by keeping to a minimum the amount of sediment or debris entering stream channels.

We are equally cognizant of the considerable benefits that accrue from properly conceived and wisely applied river engineering projects. On the other hand, we are aware of the shortcomings of the complete engineering approach in failing to solve many water problems. Still other shortcomings include the impairment or destruction of timber, recreational, fish or wildlife, and other resources without full consideration of the values involved.

Maximum benefits of engineering projects can best be realized by planning and executing them as part of truly integrated programs for the development of all resources of river basins including the watershed areas. So far, this comprehensive approach has not received full attention; it should be stressed in any national water resources policy that may be recommended by the Commission.

Other Considerations

Other *considerations* which should enter into the formulation of a water resources policy include the following:

1. *The responsibility of land owners, operators, and managers to maintain satisfactory conditions of soil and water behavior.* This consideration would apply especially to watersheds which protect downstream values, including engineering works constructed for flood protection, water supplies, or related purposes.

Because of the large public interest inherent in these areas there is also a responsibility on the part of the public to provide such assistance as will better achieve stable soil and water conditions. At the same time, and in order to assure that watershed stability will be maintained, the federal government should require, as a condition of aid, the enactment of reasonable safeguards by state and local agencies as well as their active participation in watershed programs.

2. *The responsibility of water resource planning and development agencies in providing for the restoration of damaged watershed lands where their condition is a menace to downstream values or prevents the full development of the water resources.* This consideration would include the public acquisition of privately owned lands where serious instability exists, costly restorative measures at public expense are required, and the maintenance of these measures under continued private ownership is problematical.

3. *The responsibility of planning and development agencies for fully considering all land uses and values in valleys subject to flooding or other impairment by proposed river engineering projects.* All affected interests—national, regional, local—should be given full opportunity to express their views before proposals are submitted to the Congress for authorization. Where public as well as private, and intangible as well as monetary, values are significant, consideration should be given to alternative projects or to modifications in order to avoid or minimize such losses.

In this connection, the amended Coordination Act of 1946 (Public No. 732), which provides for investigations by the Fish and Wildlife Service of the effects of river-basin projects and programs on fish and wildlife, is an important forward step in the right direction. This work should be expanded and strengthened to permit the investigations to keep pace with the study and planning of the engineering features.

Whether the foregoing provisions of a national water resource policy can effectively be applied depends on the extent to which all parts of basin plans and developments can go forward together. To this end, greatly speeded up watershed investigations and planning to keep pace with the water way investigations and plans on the various river basins are badly needed to supply basic information on soil and waterflow characteristics, the effects of land use practices on runoff, erosion, and sedimentation, and the nature and values of areas that would be affected by engineering developments.

Finally, study commissions, such as that proposed for the Arkansas River

drainage, are desirable on all river basins prior to the time that individual agencies are authorized to develop plans and make recommendations for water resource projects or programs. Obviously, such commissions should not be handicapped by having too little time in which to make the needed studies.

South Carolina Leads

Comparable membership figures for 1940 and 1949 reveal that during that time the number of Society members in South Carolina has increased more rapidly than has been the case in any other state. The *increase* in South Carolina was 177 percent of the 1940 membership figure. The increase for the Society as a whole during the same period was 40 percent. Total membership on April 1, 1950 was 6,512.

States showing greatest gains in Society membership are listed below.

State	*Percent Increase*	*1949 Membership*
South Carolina	177	130
Delaware	150	10
Mississippi	147	121
Florida	129	139
Oregon	125	512
Georgia	120	242
West Virginia	119	85
Louisiana	114	173
Washington	110	381
Illinois	105	86
Alabama	95	125
Texas	89	106
Maine	82	113

Although Delaware shows a 150-percent increase, there are now only 10 members in that state.

California, with a 41-percent increase, now has more members than any other state, a total of 606 on November 30, 1949.

Appalachian Section to Compile Index

William D. Miller, Division of Forestry, North Carolina State College, Raleigh, N. C., has been named chairman of an Appalachian Section Committee to compile a cumulative index of the JOURNAL OF FORESTRY from 1940 through 1949. The appointment was made by A. E. Wackerman, Section chairman.

Members of the committee are George K. Slocum, Lenthall Wyman, and Wm. K. Beichler.

This is the third such cumulative index to be compiled by the Appalachian Section. The current one will be ready for distribution early in 1951.

Dues Deadline Shortened

According to the revised Constitution and Bylaws, dues for 1950 must be paid by June 30 for members to remain in good standing. Those in arrears on July 1, according to a 1948 amendment, are considered to be in bad standing and forfeit, until their dues are paid, the right to vote, to be elected to office, or to receive the official publications of the Society. Formerly, delinquent members received 12 or 15 issues of the JOURNAL OF FORESTRY before they were dropped for non-payment of dues.

Members in bad standing after July 1 can be restored to good standing by remitting the current year's dues prior to November 30. According to Bylaw 21 which was revised by the Council in March 1950, members whose dues remain unpaid on November 1 will be notified that their dues must be paid by November 30 or their membership will automatically terminate on that date, unless a request for postponement of payment is granted. Terminations of membership became effective on December 31 formerly. This change will better distribute the workload of the Society office staff. November 30 is the end of the Society's fiscal year. Dues apply to the calendar year, however.

Members who resigned in arrears or were dropped for nonpayment of dues in 1949 or previously must pay back dues, not to exceed those for one year, before they are eligible for reinstatement. In the future, back dues which must be paid prior to reinstatement will not exceed those for one-half year. This will apply to members who were dropped on November 30, 1950 and in subsequent years.

Privilege Extended

A revision of Bylaw 32, "Reinstatement," has extended indefinitely the time in which members of the armed services who were dropped for nonpayment of dues during the war can be reinstated without the payment of back dues.

Prior to the revision, that privilege ended one year after the former member's return to civilian life. In regular reinstatement procedures, members who resigned in good standing are charged no back dues and members who resigned in bad standing or were dropped for nonpayment of dues, are charged only the dues for the time their dues were in arrears, not to exceed one year.

On all applications for reinstatement, no endorsements are required. Using a standard application form, the former member submits it direct to the Society office. Reinstatements are effective immediately upon application, provided that back and current dues are paid, but are probational until 30 days after the date of publication in the JOURNAL of the candidacy of former members for reinstatement.

Queries and Quotes

"I believe the new Section Manual will do more good and clear up more points and be more help all the way around than anything the Society has put out to date."—AKD.

The Section officers who helped build the Section Manual knew what they were talking about.—RDH.

"Chapters which succeed particularly well will probably be noted as post-graduate schools for the membership and success will depend on intelligent direction of effort toward study and solution of problems and preparation of good demonstrations."—EFM.

"It seems to me that the job of the Chapter is to furnish better contacts between members of the profession and to provide the fellowship and widening of professional horizons that such contacts produce."—EWL.

Both of the above statements are indicative of creative thinking.—RDH.

"[Forestry graduates] cannot hope to achieve full success unless they can be identified as active participants in the Society's professional program."—JHK.

The quoted Member urged a positive program to indoctrinate forestry students in the advantages of Society membership.—RDH.

Roundup in Progress

S. Blair Hutchison, chairman of the 20-man membership committee in the Northern Rocky Mountain Section has launched a project to compile a list of all foresters in the Section. When completed, the committee's report will show what proportion of the foresters in the Section are members of the Society.

Similar projects have been undertaken in several other Sections, usually on a state-wide basis.

C.V.A. Bill Debated

Senate Bill 1645, relating to the proposed Columbia Valley Administration, was the principal subject of discussion at the March 3 meeting of the Puget Sound Section in Seattle which was attended by 97 members and guests. Chairman Vincent Bosquet and Donald Hopkins, vice chairman, shared duties in presiding at the meeting.

Delbert Taylor, program chairman, introduced Charles S. Cowan who served as moderator of the timely debate. Former U. S. Senator C. C. Dill of Spokane, Wash. spoke in favor of the C.V.A. bill, while Holland Houston of Olympia, Wash. opposed it.

During a spirited discussion which followed, the overlapping authority of present federal agencies was cited as was the danger of concentrating too much authority in a three-man board.

Herbert M. Peet, chairman of the Columbia River Interagency Committee, said, "I would not speak wholly for the C.V.A. bill as now drawn because certain features should be changed. We have got to give thought to some means of administering the development of the natural resources in this region . . . It may or may not be a C.V.A."

Rio Grande Valley Problems Discussed

The Southwestern Section met in Santa Fe, N. Mex. on February 24 and 25 for a discussion of the problems of the Rio Grande watershed.

After a morning business session, the Section was addressed briefly by Governor Thomas J. Mabry of New Mexico preceding the presentation of technical papers during the afternoon of February 24.

C. L. Forsling discussed the history and future of the Rio Grande valley from the standpoint of conservation of its natural resources.

In describing the wildland resources of the valley, Erwin A. Schilling discussed the need for state and federal laws to maintain the natural resources. Ensuing remarks from the floor emphasized the possibilities for improvement in all lines of conservation.

John R. J. Bradshaw discussed soil and water management, pointing out a decline in water absorption on soil under various vegetative types. He indicated the need for retaining good ground cover to improve the absorptive powers of the various soils, thus preventing sheet erosion.

Milton J. McColm pointed out the tremendous possibilities of the Rio Grande valley in providing outdoor recreation for the increasing number of visitors to the Southwest.

Raymond Price illustrated with colored slides a talk which emphasized the need for further research to solve the many conservation problems of the Rio Grande Valley.

On the morning of February 25 the members were conducted on a trip through Los Alamos, where they heard a talk on the development since 1943 of the "Atomic City" of 10,000 persons. During the afternoon the group was taken on a guided tour of Bandelier National Monument.

S. T. Carlson, regional forester in Region Three of the National Park Service was general chairman of the meeting. Section officers are James A. Egan, chairman; Kenneth O. Wilson, vice chairman; Paul Buss, secretary-treasurer; and George Meagher, membership chairman. Harold M. Ratcliff prepared the report of the meeting.

Physiologist Reports Trip to Australia

The regular monthly meeting of the Southern California Section was held on March 17 at Arcadia, Chairman William G. Kohner presiding.

Henry Clepper, executive secretary, discussed Society affairs.

The featured speaker of the evening was Dr. James Bonner, a plant physiologist of California Institute of Technology, who gave an illustrated talk on a recent scientific trip he had made to Australia and New Zealand. Dr. Bonner was introduced by Program Chairman B. H. Paul.

Following a report on Section finances by Secretary Treasurer Robert H. Parsons, the Section voted to contribute $25 toward the Society's forthcoming directory of members.

Clawson Addresses Washington Section

Marion Clawson, director of the Bureau of Land Management, was the guest speaker at the meeting of the Washington, D. C. Section on March 23. He discussed the conservation activities of the agency.

Forest-Wildlife Group Meets in San Francisco

Twenty-five members and several guests attended the meeting of the Division of Forest-Wildlife Management held at San Francisco, Calif., on March 7, 1950 in connection with the 15th North American Wildlife Conference. Chairman Fred Cronemiller presided.

Lee E. Yeager, associate editor of the JOURNAL OF FORESTRY, emphasized the need for illustrated articles showing the opportunities and problems of wildlife management relating to forestry.

Paul Dalke reported excellent progress by the committee for the forest-wildlife section of the Foresters' Field Manual, of which he is chairman.

Desirability of working with the Wildlife Society committee on educational standards and accrediting schools of forest-wildlife management was discussed. It was the concensus of the meeting that, if the Wildlife Society undertakes this responsibility, experience of the SOCIETY OF AMERICAN FORESTERS in accrediting forest schools would be helpful, and should be offered. A committee was appointed to prepare a statement regarding wildlife management in forestry and range management curricula. It consists of the following members: Harold Steinhoff, chairman, Starker Leopold, Paul Herbert, Ted Fearnow, and Ernest Swift.

Robert Rutherford outlined some of the difficulties in assigning economic values to the wildlife resource and described types of forest-wildlife projects conducted under the Pittman-Robertson program.

Northern California Issues Newsletter

In the first issue of the Northern California Section's recently inaugurated newsletter, editor George A. Craig reported the recent activities of of that Section's seven Chapters. Public Law 273 has been a subject of discussion at several Chapter meetings. Other topics include grazing in national forests, forestry in Scandinavian countries, the work of the Institute of Forest Genetics, and the plywood industry in California.

The units comprising the Northern California Section are Eldorado-Amador, Redding, San Joquin, Bay Area, Feather River, Sacramento, and Redwood.

Also reported in the newsletter was a resume of the Section's winter meeting held in San Francisco on December 3. Approximately 390 members and visitors attended.

A. B. Hood served as discussion chairman on the subject, "Meeting California's Wood Needs in the Future." Participants were W. S. Johnson, Horace J. Andrews, Henry Vaux, E. T. F. Wohlenberg, L. N. Erickson, W. S. Price, Frank Solinsky, Ben Hughes, and DeWitt Nelson.

George A. Craig was chairman of a discussion on "Relative Responsibilities and Opportunities of Government, Industry, and the Citizen in Forest Conservation and Management" which was led by R. E. McArdle, W. B. Greeley, and George R. Stewart.

"Cooperation of Industrial and Government Foresters in the Public Interest" was the subject of the banquet address given by C. D. Orchard, deputy minister of forests of British Columbia.

Pollution Legislation Discussed in Wisconsin

A discussion of recent water pollution legislation in Wisconsin as affecting forest utilization was featured at the annual meeting of the Wisconsin-Upper Michigan Section at Green Bay, Wis. on February 24 and 25.

J. M. Hobderby, director of the Sulphite Pulp Manufacturers Research League, presented a paper which covered the recent water pollution legislation in Wisconsin. H. T. J. Cramer, assistant director of the Wisconsin Conservation Department, a member of the State Water Pollution Committee, and a Member of the Society, led the discussion and explained the regulatory work of the committee.

Other papers presented at the meeting were given by James N. Fisher and Stanley F. Welsh on the "Proposed Forest Survey of Wisconsin," and Leland Hooker on "Woods Safety."

At the banquet Friday evening, February 24, Joseph Stoeckeler showed colored slides of his trip to Europe last summer at which time he attended the World Forestry Congress in Finland. Earl Wright of the Neville Public Museum in Green Bay showed a moving picture *Nature's Calendar in Color* which featured particularly good shots of aquatic bird life in native habitats.

At the close of the business session on Saturday morning, retiring Chairman F. G. Wilson, superintendent of cooperative forestry for the Wisconsin Conservation Department, turned over the gavel to William Brown, assistant chief forester for the William Bonifas Lumber Company, who will guide the Section activities in the year ahead. Jordan Korotev, district forester of the Wisconsin Conservation Department succeeded R. W. Abbott, University of Wisconsin, as secretary-treasurer.

Candidates for Membership

Candidates for membership whose applications were received in the Society office prior to April 1, 1950 are listed below. Names, positions, addresses, education, and endorsers are given.

Action regarding the eligibility of these candidates will be taken by the Council as of June 1, 1950. Comments, protests, or important information regarding the qualifications for membership of candidates listed are invited from present voting members. All such communications are kept strictly confidential, being used only by the Council in taking final action on applications. Correspondence should be received in the Society office prior to June 1, 1950.

The names of those candidates who are elected will be published in the Society Affairs department of the July 1950 JOURNAL OF FORESTRY. The names of those who signify their acceptance of election will be published in subsequent issues of the Journal.

Allegheny Section

Junior Grade

Harrar, R. D., Farm Forester, Pa. Dept. of Forests & Waters, Bloomsburg, Pa.; Pa. State, B.S.F., 1949. S. A. Cobb, W. H. Smith, E. C. Pyle.

Kaczynski, H., Asst. Forester, Dept. Cons. & Economic Dev., Trenton, N. J.; N. C. State, B.S.F., 1947. N. F. Kessler, J. J. Truneer, L. C. Smack.

Kaufman, H. P., Highway Forester, Pa. Dept. of Highways, Harrisburg, Pa.; Pa. State, B.S.F., 1938. Reinstatement.

Merrell, J. O., Farm Forester, Pa. Dept. of Forests & Waters, Bloomsburg, Pa.; Pa. State, B.S.F., 1942. W. H. Smith, S. S. Cobb, E. C. Pyle.

Powell, G. E., Asst. Dist. Forester, State of Maryland, Salisbury, Md.; Pa. State, B.S.F., 1949. J. J. Mohr, K. E. Pfeiffer, A. R. Bond.

Robertson, G. K., Asst. Dist. Forester, Dept. of State Forests & Parks, Salisbury, Md.; Iowa State, B.S.F., 1949. J. J. Mohr, K. Pfeiffer, A. R. Bond.

Van Pelt, M. R. Sr. Forester, Bur. of Forests and Waters, Harrisburg, Pa.; Pa. State, B.S.F., 1950. V. Beede, O. A. Schmidt, H. H. Chisman.

Associate Grade

Potter, H. S., Forester, U.S.F.S., Phila., Pa.; Pa. State, B.S., (Biology), 1938; M. S., 1939. Allegheny.

Appalachian Section

Junior Grade

Alfred, J. W. R., Field Asst., International Paper Co., Columbia, S.C.; W. Va., B.S.F., 1942. T. H. Davis, A. E. Wackerman, P. A. Griffiths.

Ellis, C. W. Jr., Asst. Dist. Forester, S. C. State Comm. of Forestry, Florence, S. C.; Univ. of Ga., B.S.F., 1949. A. E. Kunz, W. T. Ahearn, W. J. Barton.

Flickinger, H. H., Dist. Supt., Wood Procurement, International Paper Co., Georgetown, S. C. Appalachian.

Fortin, J. B., Forester, U.S.F.S., New Bern, N. C.; N. Y. State, B.S.F, 1932. Reinstatement.

Member Grade

Custard, W. F., Asst. Forester, Va. Forest Service, Charlottesville, Va.; Pa. State, B.S.F., 1939. Appalachian (Jr. member, 1946).

Ferguson, M. B., Box 711, Summerville, S.C. Appalachian (Jr. member, 1944).

Hoffman, W. H., Forest Engr., Champion Paper and Fibre Co., Canton, N. C.; Univ. of Mich., B.S.F., 1940. Appalachian (Jr. member, 1947).

Lehocky, A. A., Mgmt. Asst., S. C. State Comm. of Forestry, Columbia, S. C.; Univ. of Ga., B.S.F., 1941. Appalachian (Jr. member, 1946).

Affiliate Grade

Lee, R. B., Director, Sand Hills State Forest, Patrick, S. C. Appalachian.

Central States Section

Junior Grade

Doll, A. D., Student, Univ. of Mich., Ann Arbor, Mich.; Univ. of Mich., B.S.F., 1950. W. W. Chase, S. A. Graham, J. W. Brown.

Gingrich, S. F., Dist. Forester, State of Illinois, Harrisburg, Ill.; Pa. State, B.S.F., 1950. H. Switzer, E. E. Nuttila, H. F. Siemert.

Guenther, W. J., 437 Hamilton Place, Ann Arbor, Mich.; Univ. of Mich., B.S.F., 1950. S. W. Allen, K. P. Davis, W. W. Chase.

Harrington, T. A., Forestry Aid, Central States Forest Exp. Sta., Columbus, Ohio; Iowa State, B.S.F., 1949. E. Roberts, M. E. Becker, J. T. Morgan.

Lane, R. S., Forest Rgr., Ohio Div. of Forestry, Wooster, Ohio; Mich. State, B.S.F., 1948. R. J. Lindl, B. E. Leete, E. A. Conway.

Nordberg, J. S., 716 Jones Street, St. Joseph, Mich.; Mich. State, B.S.F., 1949. P. A. Herbert, A. J. Panshin, R. C. Deckert.

Redett, R. B., Dist. Forester, Div. of Forestry, Wooster, Ohio; Mich. State, B.S.F., 1942. E. A. Conway, H. H. Peck, B. H. Bentley.

Thompson, R. L., Dist. Leader, White Pine Blister Rust Control, Lansing, Mich.; Mich. State, B.S.F., 1948. H. N. Putman, G. R. Allison, R. W. Blair.

Columbia River Section

Junior Grade

Lindsten, A., Research Forester, Oregon State Board of Forestry, Salem, Ore.; Oregon State, B.S.F., 1940. J. E. Sowder, W. G. Dahms, E. L. Mowat.

Milius, Hans C., Forester, Brooks-Scanlon, Inc., Bend, Ore.; Iowa State, B.S.F., 1936, M.S.F., 1937. Reinstatement.

Sim, J. R., Forestry Aid, U.S.F.S., Medford, Ore.; Univ. of Idaho, B.S.F., 1949. R. W. Appleby, G. R. Leavengood, L. Bransford.

Stenerson, M. R., Forester, Gifford Pinchot Natl. Forest, Vancouver, Wash.; Univ. of Wash., B.S.F., 1934. H. V. Hall, A. J. Sandoz, J. M. Hisey.

Member Grade

Alexander, C. J., Route 1, Box 804, Veneta, Oreg. Columbia River (Jr. member, 1943).

Burwell, D. C., Row River Lbr. Co., Darena, Oreg. Columbia River (Jr. member, 1944).

Cook, F. W., 1960 N. W. Lovejoy, Portland, Oreg. Columbia River (Jr. member, 1943).

Forgey, L. K., U.S.F.S., Bly, Oreg. Columbia River (Jr. member, 1944).

Grant, J. E., Elsie St., Jewell, Oreg. Columbia River (Jr. member, 36R46).

Hann, J. H., 565 Judson St., Salem, Oreg. Columbia River (Jr. member, 1944).

Helland, M. L., 220 South 24th St., Salem, Oreg. Columbia River (Jr. member, 1944).

Hutchison, R. W., 720 Harlow Rd., Eugene, Oreg. Columbia River (Jr. member, 1940).

Jester, C. M., Florence, Oreg. Columbia River (Jr. member, 1944).

Kintigh, R. G., Route 2, Box 273, Eugene, Oreg. Columbia River (Jr. member, 1943).

Kleiner, R. E., 130 S. Pine St., Roseburg, Oreg. Columbia River (Jr. member, 1942).

Layman, P. A., Car Ad. Co., Klamath Falls, Oreg. Columbia River (Jr. member, 1944).

McCabe, F. R., P.O. Box 343, Cottage Grove, Oreg. Columbia River (Jr. member, 1936).

Poulton, C. E., Oregon State College, Corvallis, Oreg. Columbia River (Jr. member, 1944).

Randall, W. R., Oregon State College, Corvallis, Oreg. Columbia River (Jr. member, 1944).

Smith, G. C., 933 S. 7th St., Coos Bay, Oreg. Columbia River (Jr. member, 1939).

Sproat, W. J., 1509 N.E. 10th St., Portland, Oreg. Columbia River (Jr. member, 21R38).

Templin, R. L. Jr., Prospect, Oreg. Columbia River (Jr. member, 1944).

Theno, D. J., 401 W. Bridge, Grants Pass, Oreg. Columbia River (Jr. member, 1944).

Walter, J. M., Lebanon Lbr. Co., Lebanon, Oreg. Columbia River (Jr. member, 1939).

Williamson, P. E. Jr., 6930 S.E. 35th Ave., Portland, Oreg. Columbia River (Jr. member, 30R49).

Young, H. D., Box 236, Powers, Oreg. Columbia River (Jr. member, 1942).

Gulf States Section

Junior Grade

Eldridge, T. S., Forester, U.S.F.S., Senatobia, Miss.; La. State, B.S.F., 1943. I. W. Miller, F. D. Mayfield, B. J. Huckenpahler.

Fitzgerald, O. L., Forester, S.C.S., Shreveport, La.; La. Poly. Institute, B.S., (Forestry), 1948; Duke, M.F., 1949. L. F. Blackwell, H. E. Gustin, E. J. Russell.

Scott, F. W., Area Forest Rgr., Miss. Forest Service, Jackson, Miss.; La. State, B.S.F., 1949. I. W. Miller, F. D. Mayfield, H. W. Burke.

Sessions, L. C., Asst. State Forester, Miss. Forestry Comm., Jackson, Miss.; La. State, B.S.F., 1934. Reinstatement.

Affiliate Grade

Howell, P. N., Public Relations Representative, International Paper Co., Howison, Miss.; Forestry Adviser, L. N. Dantzler Lbr. Co., Howison, Miss. Gulf States.

Kentucky-Tennessee Section

Junior Grade

Fields, J. G., Forester, Ashby Veneer and Lbr. Co., Jackson, Tenn.; Univ. of Ga., B.S.F., 1946; M.S.F., 1947. A. E. Patterson, R. D. Dixon, E. A. Hargreaves, Jr.

New England Section

Junior Grade

Carr, J. A., Student, Harvard, Petersham, Mass.; Univ. of Toronto, B.S.F., 1947. New England.

Hibbard, W. F. Jr., 6 Ballard St., Bridgton, Maine; Univ. of Maine, B.S.F., 1950. G. Baker, R. I. Ashman, F. K. Beyer.

Hunt, F. M., Forester-owner, New England Silvicultural Service, Springfield, Vt.; Univ. of N. H., B.S.F., 1947. New England.

Member Grade

Provencher, P., Chief Forester, Ontario Paper Co., Montreal, Quebec, Can.; Laval Univ., B.A., 1925. Reinstatement.

New York Section

Junior Grade

Brown, G. S., Work Unit Cons., S.C.S., Hamburg, N. Y.; N. Y. State, B.S.F., 1937. L. P. Plumley, R. G. Unger, F. E. Carlson.

Erwin, E. B., Jr. Forester, N. Y. State Cons. Dept., Middletown, N. Y.; Univ. of Maine, B.S.F., 1942. S. J. Bascom, R. I. Ashman, G. Baker.

Lupsha, J. M., 9925—211 St., Bellaire, N. Y.; Univ. of Maine, B.S.F., 1950. R. I. Ashman, F. K. Beyer, G. L. Chapman.

Sweet, R. C., Supv., Gypsy Moth Control, N. Y. State Cons. Dept., Albany, N. Y.

Weight, F. F., Forester, N. Y. State Cons. Dept., Albany, N. Y.; N. C. State, B.S.F., 1939. Reinstatement.

Member Grade

Charlton, J. W., Farm Bureau Office, Gloversville, N. Y. New York (Jr. member, 30R38R41R49).

Northern California Section

Junior Grade

Courtney, H., Forester, U. S. Indian Service, Hoopa, Calif.; N. Y. State, B.S.F., 1948. W. Zeh, M. L. Robertson, W. B. MacMillan.

Craft, A. C., Div. of Forestry, Fresno, Calif.; N. C. State, B.S.F., 1949. D. F. Schlotzhauer, C. E. Metcalf, R. F. Grah.

McBride, R. S., Forestry Aid, Calif. Forest & Range Exp. Sta., Berkeley, Calif.; Univ. of Calif., B.S.F., 1949. C. C. Buck, R. C. Hall, A. L. Hormay. (Aff. member, 1942).

Associate Grade

Clark, E. C., Entomologist, Forest Insect Lab., Berkeley, Calif.; Univ. of Calif., B.S., (Forest Entomology), 1949. Northern California.

Ozark Section

Junior Grade

Mitchell, R. E., Crew Chief, Pomeroy & McGowin, Monticello, Ark.; Duke, B.S., (Forestry), 1942. Ozark.

Affiliate Grade

Oliver, G. L., Field Asst., International Paper Co., Malvern, Ark. Ozark.

Southeastern Section

Junior Grade

Beal, J. F., Fire Control Aid, Fla. Natl. Forest, Tallahassee, Fla.; Univ. of Fla., B.S.F., 1950. H. S. Newins, E. A. Ziegler, C. G. Geltz.

Burke, L. F., Forester, Union Bag & Paper Corp., Savannah, Ga.; Univ. of Ga., B.S.F., 1949. R. V. Malecki, B. E. Allen, G. C. Shoptaw.

Cox, G. T. Cons. Aid, S.C.S., Lake Butler, Fla.; Univ. of Fla., B.S.F., 1949. E. A. Ziegler, H. S. Newins, C. G. Geltz.

Helmken, R. D., Cons. Forester, Union Bag & Paper Corp., Savannah, Ga.; Univ. of Ga., B.S.F., 1948. B. E. Allen, C. H. Cannon, R. V. Malecki.

Johnston, J. G., Proj. Forester, Div. of Forestry, Birmingham, Ala.; Birmingham Southern College, B.S., 1937; Duke, M.F., 1949. C. F. Korstian, A. E. Wackerman, E. S. Harrar.

Stewart, F. M., Proj. Forester, Ala. Power Co., Birmingham, Ala.; Ala. Poly. Institute, B.S., (Forestry), 1948. Southeastern.

Urling, G. P., Grad. Student, Univ. of Fla., Gainesville, Fla.; Univ. of Fla., B.S.F., 1950. C. G. Geltz, T. G. Herndon, P. W. Frazer.

Veley, H. J., Salesman, Kut Kwick Tool Co., Brunswick, Ga., Univ. of Fla., B.S.F., 1950. H. S. Newins, C. G. Geltz, E. A. Ziegler.

Member Grade

Dyal, J. E., Jr., Box 81, Surrency, Ga. Southeastern (Jr. member, 1941).

Affiliate Grade

Lovingood, B. S., Forester, Hosford Unit, St. Joe Paper Co., Port St. Joe, Fla. Southeastern.

Upper Mississippi Valley Section

Junior Grade

Drexler, R. E., Dist. Forester, Iowa State Cons. Comm., Adel, Iowa; Iowa State, B.S.F., 1949. G. B. Hartman, L. F. Kellogg, D. W. Bensend.

Herrick, D. E., Instr., Iowa State College, Ames, Iowa; Iowa State, B.S.F., 1947. G. B. Hartman, A. L. McComb, L. F. Kellogg.

Meyer, J. D., Research Asst., Univ. of Minn., St. Paul, Minn.; Univ. of Minn., B.S.F., 1949. R. M. Brown, H. I. Hansen, Y. Weinstein.

Member Grade

Boyesen, G. H., Forest Rgr., Div. of Forestry, St. Paul, Minn.; Univ. of Minn., B.S.F., 1939. Upper Mississippi Valley (Jr. member, 1944).

Moore, F. I., Mgr. of Sales, Maurice J. Salisbury Co., Grand Rapids, Minn.; Univ. of Minn., B.S.F., 1936. Reinstatement.

Affiliate Grade

Johnson, M. H., Independent Logging Contractor, Littlefork, Minn. Upper Mississippi Valley.

Washington, D. C. Section

Junior Grade

Graham, D. P., Agent, Div. of Forest Pathology, Beltsville, Md.; Univ. of Idaho, B.S.F., 1949. R. T. Bingham, F. O. Walters, M. C. Riley.

Kelley, W., Foreign Service Staff Officer, Dept. of State, Washington, D.C.; Univ. of Fla., B.S.F., 1950. R. B. Smith, R. W. Frazer, H. S. Newins.

Member Grade

Pletcher, C. R., 1528 25th Street, S. E., Washington, D. C. Washington (Jr. member, 1942).

Wisconsin-Upper Michigan Section

Junior Grade

Langenbach, C. A., Tbr. Inspt., C. V. Branham Lbr. Co., Eagle River, Wis.; Univ. of Mich., B.S.F., 1942. J. N. Fisher, D. J. Mackie, A. J. Yorman.

Washburn, R. D., Forestry Consultant, Marquette, Mich.; Univ. of Mich., B.S.F., 1939. G. Banzhaf, D. B. Whittier, C. G. Stewart.

Candidates Elected

The following persons were elected to the indicated grades of membership by the Council on April 1, 1950.

Junior Grade

Adkins, V. C.	Hughes, W. G.
Altman, J. A.	Irving, F. D.
Ashley, B. S.	Johnson, A. W.
Avery, T. E.	Johnson, C. J.
Baris, D. M.	Johnson, H. D.
Bauman, R. H.	Jones, W. T.
Bean, P. W.	Juntilla, H. W.
Beverly, P. C.	Kiles, G. F.
Bradshaw, R. I.	Kitchens, J. H.
Brigham, L. H.	Levin, O. R.
Broadway, C. A.	Lyon, E. L.
Burns, J. G.	Martin, R. W.
Clough, J. H.	Mauer, B. H.
Cole, W. H.	McKelvey, C. G.
Connelly, J. F.	Miller, P. S.
Coulter, W. K.	Mitchell, W. J.
Davis, C. N.	Morgan, R. G.
Dunn, R. L.	Parnell, C. W.
East, J. W.	Perrigo, R. A.
Evans, G. G. (re.)	Peters, D. L.
Fernette, W.	Rappleye, R. E.
Findley, J. E.	Reeves, W. A.
Grafer, W. C.	Rich, A. A.
Green, D. A.	Roddenberry, R. F.
Greer, J. K.	St. John, C. H.
Hamby, E. W., Jr.	Schoder, T. H.
Hammer, G. W.	Thigpen, V. G.
Haskins, E. R.	Thompson, W. P.
Henricksen, J. C.	Turner, W. F.
Herrala, I. E. (re.)	Weatherly, J. H.
Hirsch, E. C.	Wheeler, W. P.
Hofmann, J. G.	Wike, C. O.
Holcombe, E. D.	Woods, F. W.
Howard, E. R.	Worsham, J. N.
Hughes, A. L.	Wyckoff, P. J.
Hughes, J. D.	

Member Grade

Anderson, E. A.	Maki, K. N.
Bradshaw, J. R.	Mazzetta, A. J.
Cox, R. G.	McDuff, C. E.
Cutler, D. D.	Perry, E. W.
Harrington, D. G.	Ravenscroft, W. V.
Johnson, R. W.	Rullington, W.
Lavely, J. E.	Skog, R. E.
Leisenring, L. S.	Steidemann, R. W.
Lynch, D. B.	Torgerson, G. H.

Affiliate Grade

Sellers, J. D.

Associate Grade

Bullock, E. R.	Stevens, J. F.
Perry, H. J.	

New Members and Advancements

The new members and members who have been advanced in grade who are listed below are eligible for participation in activities of the Society of American Foresters, including the meetings and projects of Sections, Chapters, Divisions, and Committees. They have submitted their applications for membership, properly endorsed, and have been declared eligible by the Council. By accepting election, these members have indicated their desire to assist or continue assisting the Society in the fulfillment of its objectives.

Allegheny Section

Junior Grade

Judy, D. T., Circlesville, W. Va.

Thomson, K. G., 426 Crown St., Morrisville, Pa.

Appalachian Section

Junior Grade

Alvis, R. J., 324 55th St., Newport News, Va.

Boyer, S. G., Box 5775, State College Sta., Raleigh, N. C.

Garrison, J. E. R., Rt. No. 1, Box 294, Gaffney, S. C.

Howell, W. E., Box 50, McClellanville, S. C.

Perkins, E. G., P.O. Box 7527, Asheville, N. C.

Central Rocky Mountain Section

Junior Grade

Moon, G. C., State Park Office, Hermosa, S. Dak.

Smith, J. E., 200 East Laurel, Fort Collins, Colo.

Central States Section

Junior Grade

Auble, R. G., 23 Detroit St., S.W., Grand Rapids, Mich.

Daugherty, R. G., 525 N. 6th St., Lafayette, Ind.

Haitsch, L. J., 409 Willow Lane, E. Lansing, Mich.

Haskell, T. J., 720 E. Lincoln, Royal Oak, Mich.

Member Grade

Becker, F. C. Jr., 1333 Wonderland Blvd., Blacklick, Ohio.

Affiliate Grade

Sample, J. L., 411 E. Main St., Madison, Ind.

Columbia River Section

Junior Grade

Hansen, G. M., 1410 S. W. Morrison, Portland, Oreg.

Riddagh, D. W., Weyerhaeuser Tbr. Co., Castle Rock, Wash.

Schroeder, R. E., 543 Lawrence St., Eugene, Oreg.

Member Grade

Stam, E. P., 1400 Public Service Bldg., Portland, Oreg.

Gulf States Section

Junior Grade

Cooper, J. W., 303 Wellington Rd., Jackson, Miss.

Gayle, J. A., Agric. Ext. Service, Minden, La.

Scott, T. R., Box 304, Woodville, Tex.

Affiliate Grade

Kennedy, D. P., Oakdale, La.

New England Section

Junior Grade

Brinsfield, W. R., 158 Union Ave., West Haven, Conn.

Damon, H. S., North Conway, N. H.

McNally, J. A., 1407 Oak Ave., Quebec, Can.

Sowinski, E. S., Johnson Rd., Woodbridge, Conn.

New York Section

Member Grade

Willsie, R. L., Box 55, Stow, N. Y.

Northern California Section

Junior Grade

Hundt, J. R., Thorp Hotel, McCloud, Calif.

Mullen, A. H., U.S.F.S., Greenville, Calif.

Wilson, H. E., Capt., Hamilton A.F.B., Hamilton, Calif.

Associate Grade

Johnson, W. S., 1 Montgomery St., San Francisco, Calif.

Leopold, A. S., Museum of Vertebrate Zoology, Berkeley, Calif.

Ozark Section

Junior Grade

Kelly, A. W. Jr., 5137 Southwest Ave., St. Louis, Mo.

Longsworth, T. W., Box 229, Lebanon, Mo.

Pearson, M. W., 1715 S. Oronogo St., Webb City, Mo.

Associate Grade

Krusekoff, H. H., Columbia, Mo.

Puget Sound Section

Junior Grade

Johnson, W. H., 1410 W. Webster, Seattle, Wash.

Kansky, G. W., U.S.F.S., Twisp, Wash.

Member Grade

Grell, H. V., % State Forestry Heights, Shelton, Wash.

Southeastern Section

Junior Grade

Morgan, R. A., 1635 E. 12th St., Jacksonville 6, Fla.

Rawls, M. G., St. Regis Paper Co., Fargo, Ga.

Member Grade

Bridges, W. J., Hollingsworth & Whitney Co., Mobile, Ala.

Kirkpatrick, J. C., Gulf States Paper Corp., Tuscaloosa, Ala.

Wilson, H. A., Grayson, Ala.

Affiliate Grade

Freeman, E. M., 2003 19th St., Northport, Ala.

Loper, E. E., 1425 22nd Ave., Tuscaloosa, Ala.

Southwestern Section

Junior Grade

Rea, R. E., Coconino Natl. Forest, Flagstaff, Ariz.

Washington D. C. Section

Junior Grade

Gee, M. A., 1017 Wakefield, Alexandria, Va.

Wisconsin-Upper Michigan Section

Junior Grade

Castongnay, M. L., Wisconsin Cons. Dept., Madison, Wis.

Forestry News

Charles F. Evans Retires, Frank Albert Named Successor

Retirement of Charles F. Evans, assistant regional forester in charge of cooperative federal-state forestry programs in the South for the past 23 years, and designation of Frank Albert as his successor was effective March 31.

Frank Albert, a graduate of the Pennsylvania State Forest School was in charge of the Division of Lands for the Southern Region, and has had 21 years of experience in various parts of the South.

FRANK ALBERT

CHARLES F. EVANS

One of the Forest Service's outstanding administrators for many years, Mr. Evans retires after 38 years of continuous service in the Northwest and in the South. A native of Wisconsin, he was graduated from the University of Wisconsin in 1910 and obtained a master's degree in forestry from Yale University in 1912. His first work in the Forest Service was on the Boise National Forest in Idaho where he made growth measurements on yellow pine. He was forest supervisor on the Lemhi National Forest in 1918, and in 1923 he moved up to the regional forester's staff in charge of roads and trails.

Mr. Evans came to the South in 1927. He organized the Clarke-McNary reforestation in the region. During his cooperative work in fire control and tenure of office, protection in the South has grown from some 37 million acres of private forest land under protection to over 100 million today. Some 900,000 acres of private forest land have been planted and the cooperative reforestation work has grown to an annual production of about 200 million seedlings. He developed, in cooperation with state agencies, a program of assistance to private owners in forest management. These three programs constitute an outstanding job in public service. He has served as chairman for the SOCIETY OF AMERICAN FORESTERS in the four sections blanketing the South. For two terms, he was a member of the Council of the Society. And he is now president of the Society.

Frank Albert, the new chief of cooperative private forestry programs, entered the Forest Service as a forest ranger on the White Mountain National Forest in New Hampshire. Later he served as ranger on the Shenandoah Forest in Virginia, and the Osceola National Forest in Florida.

He was appointed assistant supervisor of the Nantahala National Forest in North Carolina in 1934. Later he served as supervisor in Florida and Mississippi. He was in charge of the Texas Timber Salvage Project in 1944 and became assistant regional forester in charge of the Division of Lands in 1927.

Story of Forester Wins Award

The book, *Paul Tiber—Forester* which was reviewed in the January 1950 JOURNAL OF FORESTRY, was the winner of the 1950 award of the Child Study Association of America. Written by Maria Gleit, the story is actually a biographical account of a forester.

Everglades National Park Enlarged

The size of Everglades National Park in Florida has been increased from an estimated 460,000 acres to approximately 1,228,500 acres.

Keys, submerged lands, and waters in Florida Bay and waters in the Gulf of Mexico comprise most of the addition, all north and west of the Inland Waterway. The remainder consists of Whitewater Bay which borders on the Gulf of Mexico, and areas north, east, and southeast of the 460,000 acres included when the park was established in June 1947. Part of the northern addition borders to the south on the Tamiami Trail which crosses the state from Naples to Miami. Development of a park headquarters site in the eastern addition is now under consideration. The added lands include all of private land to be purchased with the funds made available to the federal government by the state for this purpose.

Tebbe Named General Inspector; Jemison Heads Missoula Station

Charles L. Tebbe, director of the Northern Rocky Mountain Forest and Range Experiment Station at Missoula, Mont., has been appointed as general inspector in the Washington office of the Forest Service and will assume his new duties on July 1.

The Northern Rocky Mountain Station directorship will be filled by Dr. George M. Jemison, who will be transferred from the Southeastern Forest Experiment Station in Asheville, N. C., where he is chief of the forest management division.

The position of general inspector was created through authority granted by Secretary Charles F. Brannan and in response to Congressional suggestions. Mr. Tebbe will make recommendations to improve the integration of national forest management, state and private forestry, and forest and range research work of the Forest Service. Dr. Jemison worked for six years at the Missoula Station before moving to the Southeast. He has done research and administrative work at the Southeastern Forest Experiment Station in Asheville since 1937. During the last seven years, he has directed forest management research problems on seven experimental forests in southeastern states.

D. B. Smith Co. Wants Agents

With the approach of the spring fire season, D. B. Smith and Company, Utica, N. Y., manufacturers of the Indian Fire Pump, announces opening for agents to handle sales in a variety of territories. Widely increasing use of Indian pumps for grass, brush, and farm building fires as well as for forest fire use, indicate an expanding market this year. Catalogs and information are available from the company.

Positions Wanted

Graduate forester, 27, married. One year experience with State Division of Forestry in forest management and fire control. Desires permanent position with forestry-minded company. References and details on request.
Box C, Journal of Forestry, Mills Building, Washington 6, D. C.

Graduate Forester, 32; three years' experience with the U. S. Forest Service, manager of mill and logging operation for large company 3 years; five years' experience military command and operations staff duties; desires permanent position with progressive private forest enterprise or forest industry. Prefer production or marketing. Details and references upon request.
Box D, Journal of Forestry, Mills Building, Washington 6, D. C.

Position (private or state) desired in publicity, information, or education. Editorial and advertising experience. Three years' private and federal forestry experience. B.S.F., University of Michigan, 1942.
Box E, Journal of Forestry, Mills Building, Washington 6, D. C.

R. S. Kellogg Retires

Royal S. Kellogg, dean of the secretaries of the associations in the paper industry, resigned as secretary-treasurer of the Newsprint Service Bureau, on March 31, rounding out exactly 40 years of a trade association career. Vernon L. Tipka was elected secretary-treasurer after a year's service as engineer for the Bureau, and John J. Zima was elected assistant secretary.

An outstanding trade association executive, Mr. Kellogg has been first, last, and all the time a forester, and was a key figure in the movement in the early 20's, which made forest utilization and protection a major objective of the entire domestic paper industry. He was elected a Member of the Society of American Foresters in 1905 and a Fellow last year.

Mr. Kellogg, a native of New York State, was a graduate of Kansas State College in the class of 1896, and went into the U. S. Forest Service in 1901, where he set up the procedure for the collection of statistics of forest products which is still being followed. In 1910 he became the first secretary of the Northern Hemlock-Hardwood Association. Five years later he went to the National Lumber Manufacturers Association in Chicago, and in 1918 became secretary of the Newsprint Service Bureau, which was then being formed in New York.

Urges Completion of Land Study

Completion of detailed surveys to determine the capability and conservation needs of the nation's farms is urged by Chief H. H. Bennett in the 1949 fiscal-year report of the Soil Conservation Service.

He points out that this information must be provided before an adequate conservation farming program can be planned or executed for any farm. Moreover, it is desirable for planning and carrying out other agricultural programs. Dr. Bennett mentioned, for example, that evaluation of lands for taxation or loans would be sounder and more equitable if made on the basis of their capability for production; that land capability could be used as the basis for sound procedure and beneficial adjustments in all types of agricultural credit or land tenure; and that it might well be used as a guide for the wise expansion of rural road building, rural electrification, "and the orderly development of other community enterprises, especially those planned for permanency."

Although nearly 500 million acres already have been surveyed, Bennett reported, requests from farmers' soil conservation districts for farm planning assistance has so taxed the service that the soil conservation inventory work recently has not been able to move ahead as rapidly as it should. He noted that the country may not need as large production of certain crops for several years as the unprecedented production it had to have during World War II and immediate post-war years, and suggested: "hence we could have a breathing spell during which we could very well complete our soil conservation survey for the proper guidance of needed adjustments in land use and make many of the adjustments that are long overdue."

Other needs mentioned included more scientific research on some special conservation problems, intensifying conservation education through all available agencies and institutions, and encouraging and strengthening soil conservation districts, which already include more than three-fourths of the country's farms. As of June 30, 2,164 conservation districts were being assisted in the 48 states, Puerto Rico, the Virgin Islands, Hawaii, and Alaska. Altogether, the conservation districts included about 1,179 million acres, with additional districts being organized by farmers each month.

DON'T BREAK YOUR NECK
PREVENT ACCIDENTS
CUT LABOR COSTS 40% to 50%
DOUBLE PRODUCTION!
New, Amazing, LIGHTWEIGHT
ALUMINUM Comb. Sawing, Pruning, Trimming, Fruit Picking, Shaking Poles.
BANTAM WEIGHT TRIMMER No. 3
SECTIONAL POLES
⅓ WT. OF WOODEN POLES
Combine Sections of Poles to make Poles Up to 80 ft. Tall. Weighs 1 lb. per 5 ft. 60c per ft. Attachments extra. F. O. B. Los Angeles. No Breakage. No Splinters. Lasts Forever. Sections from 2 to 30 ft. Reaches Top of any tree. A 60 ft pole weighs 12 lbs.
SEND FOR FREE CATALOG.
30-foot pole weighs only 10 lbs.
J. D. Sebrell CORP.
NOW, By combining Our Sections of Poles, you can make 10 different length Poles out of 1 Pole
By inserting unexpanded end of one pole into expanded end of another and securing with two bolts you can build any desired length of pole.
Sections available in any lgth., from 2 to 30 feet. A 60 foot pole will fit in the back of your car when broken down into 12 five foot sections.
DO A JOB IN MINUTES THAT FORMERLY TOOK HOURS.
300 S. Los Angeles St. - MA. 6-9397
Los Angeles 13 Nate. NEwmark 1-8958

Tree Planting Demonstrations Conducted at Thirty Schools

Thirty schools in 21 South Carolina counties have just completed planting 54,000 pine seedlings, according to W. J. Barker, leader, Clemson Forestry Extension Work.

Purpose of these plantings is to give young people experience and to create an interest in tree planting; to establish demonstrations in forestry convenient to the schools; and to provide income for the benefit of all students through the sale of thinnings.

The plantings were a cooperative project with the Clemson Extension Service and the State Commission of Forestry working with the schools and the pulp industry including the International Paper Company, Champion Paper and Fibre Company, and Union Bag and Paper Company. Approximately 657 people took part in the actual planting of the seedlings.

In most cases the schools obtained 20-year leases on the areas where the trees were planted. All cutting will be made under the supervision of the cooperating agencies, and the proceeds from the sale of the thinnings will be spent for school improvements which will be of benefit to all.

Forestry Pays Good Hourly Wage to Wisconsin Farmers

In ten timber harvest demonstration forests in Wisconsin last fall, farmers received as much as $3 an hour for harvesting timber. And in no case did they cut more timber than had grown the year before. The lowest wage reported was $1.16 an hour, and that was in a forest of young hardwoods that needed thinning.

Demonstrations were conducted under the guidance of Fred B. Trenk, University of Wisconsin.

New Portable Radio Sets

A 26-pound radio, including weight of carrying case, handset, and antenna, has been developed by Radio Communications Equipment and Engineering, Ltd., Montreal, Canada. Known as the RCE Model TR4, two-way telephone unit, it uses standard batteries with continuous operation life of 25 hours. It has a frequency range of 2 to 6 megacycles, and is available for 1700 KCs and 29 to 30 megacycles (A.M.).

A lighter weight model for emergency use, the TR7-A, weighs only 12 pounds and is equipped with a whip antenna for use on fires and patrol work.

Big Game Population Levels Off on National Forest Areas

The big game population on national forests, once increasing at a rapid rate, has been leveling off for several years. During the last year numbers were almost static.

Statistics compiled by Lloyd W. Swift, chief of the wildlife management division, U. S. Forest Service, indicated there were an estimated 2,490,000 big game animals on national forests at the end of fiscal year 1949 as compared with an estimated 2,470,000 animals for the previous year.

This gain is so small, he said, as to be negligible. The lack of expansion probably reflects the fact that the ranges of many major deer and elk herds are now fully stocked or overstocked. Heavy losses were expected on western national forests during the bitter winter of 1949, but serious losses materialized only where there were recognized overpopulations.

Lake City Research Branch Raised to Division Status

Effective December 26, the U. S. Department of Agriculture approved full divisional status within the Southeastern Forest Experiment Station for the naval stores research work at Lake City, Florida. This is in recognition of the importance and scope that Lake City research work has assumed in the naval stores field. In accordance with the change, Dr. Carl E. Ostrom has been promoted from branch leader to division chief. Dr. Ostrom is recognized as an authority on naval stores.

The naval stores research program at Lake City was expanded in 1942. Perhaps the best-known research result has been the development of systems of applying sulphuric acid to bark-chipped trees to lengthen the period of gum-flow to two weeks, so that on a crop of 10,000 faces the woods chipper need only visit the trees half as often as formerly. This means greater efficiency, lower labor costs, and increased utility of the trees for timber products. A 1949 mid-season check indicated that acid is being used on 4 million turpentine faces this year, out of a total of 70 million. This is more than a ten-fold increase over the 300,000 faces that were acid-treated in 1946. Acid treatment methods developed at the Lake City research center will save the gum naval stores industry approximately a quarter of a million dollars this year, not including the increased value of the bark-chipped trees for wood products.

TREES FOR SALE
Forest Planting & Christmas Trees
Norway Spruce, Red Pine, White Pine, Scotch Pine, White Spruce, Colorado Blue Spruce, etc. Prices are reasonable and the trees are GUARANTEED TO LIVE.
WESTERN MAINE FOREST NURSERY COMPANY
Dept. JF. Fryeburg, Maine

FILSON
BETTER OUTDOOR CLOTHES
for Men of the
FOREST SERVICE
Since FILSON BETTER OUTDOOR CLOTHES 1897
Purveyors of the Finest Men's Outdoor Clothing
FREE Illustrated Color Booklet Sent on Request
MAIL ORDERS FILLED
Weatherman's OUTDOOR WEAR
1300 First Ave. Seattle, Wash.

Essentials Of Forest Management
We are endeavoring to administer our forest lands to obtain the greatest return from all uses. This involves the use of photogrammetry in land classification and inventory; growth studies and harvesting trees in such a way as to rescue mortality and accelerate growth.
SHASTA FORESTS CO.
Redding, California

Paul D. Kelleter (1881-1950)

Paul D. Kelleter, retired, died suddenly on March 19. Funeral services were held at St. Louis, Missouri.

Born May 1, 1881, Mr. Kelleter was a graduate of Washington University, St. Louis. He received his Masters Degree in Forestry at Yale in 1904 and entered the U. S. Forest Service in that year as a forest assistant in the office of management, serving in California on studies of forest conditions. In 1907, he was appointed by Gifford Pinchot to land examination and classification work in the Black Hills of South Dakota and became supervisor of the Black Hills National Forest in 1913. Transferred to Washington in 1918, he later became director of purchases and sales in the office of the Secretary of Agriculture. In 1930, he became director of the Wisconsin Conservation Department. Returning to the U. S. Forest Service in 1934 he was made supervisor of the Huron National Forest, then supervisor of the Clark Purchase Unit where he laid the ground work for much of the forestry progress in Missouri. He served for a time as a member of the Missouri Natural Resources Board. At the time of his retirement in 1946, he was a field representative for the Division of State and Private Forestry, with headquarters at Columbia, Missouri.

Conservation Given Division Status at Michigan State College

Conservation has stepped into a major role at Michigan State College. The State Board of Agriculture, the governing board of the college, has authorized the organization of a Division of Conservation because of the growing importance of the conservation of natural resources to the well-being of Michigan and the nation.

Professor Paul A. Herbert, head of the Department of Forestry since 1931 and on the staff of the college since 1922, has been named director of the new division. He will direct four departments consisting of the Conservation Institute, Fisheries and Wildlife, Forestry, and Wood Utilization.

The reorganization will permit more concentrated efforts in extension, teaching, and research in water and soil conservation, rural land planning and zoning, conservation education, fisheries, game management, forestry, and other phases of conservation.

Loblolly Pine Bibliography

Loblolly Pine Bibliography, covering the known publications on loblolly pine from 1890 to 1949, has been issued as Station Paper No. 6 by the Southeastern Forest Experiment Station, U. S. Forest Service, Asheville, N. C. It was compiled by Keith W. Dorman and Ivan H. Sims.

The bibliography will be of service to foresters, the authors believe, because of the economic importance of loblolly pine. Approximately half the total volume of pine timber in the South is loblolly pine, and many of the 56 pulp and paper mills, 20,000 sawmills, and other wood-using industries of the South depend upon it for their raw materials.

Northwest Industries Promote Forest Practice Policies

Crown Zellerbach Company is taking steps to encourage good forestry practices on the timberlands of other private owners in the areas from which the company secures part of its pulpwood supply.

A booklet, *Forest Practice Policy for the Northern Olympic Peninsula*, is now being distributed by Crown Zellerbach in the areas tributary to the company's Port Angeles and Port Townsend Mills. Its purpose is to encourage farmers and others to employ forest practices which will give them maximum returns and at the same time assure Crown Zellerbach with a perpetual supply of wood.

The St. Helens Pulp and Paper Company at St. Helens, Oregon, has issued a similar bulletin entitled *Timber Management for Small Woodland Owners*. Its objectives are the same as those of Crown Zellerbach — the management of all timberlands so as to produce the maximum volume of forest products.

Iowa State Research Woodland

A forest of 296 acres near Delhi is to become a demonstration and research project where practical methods of managing farm woodlands will be developed by Iowa State College and demonstrated to farmers and woodland owners of northeast Iowa.

Acceptance of the tract under the provisions of the will of the late Emma L. Brayton has been made by the state board of education. The donor directed that the timber tract be given to the college and preserved as a memorial to her father and mother.

The tract will become a part of the college program of outlying farms in various parts of the state. Plans for development will knit together the three college functions of research, resident teaching, and extension service.

A small but representative part of the tract is to be set aside as a "natural area" and as a particular memorial to the Brayton family. This area is to receive no use, but is to be available for biological studies, especially those relating to botany and zoology of undisturbed forest. It will show the trends of natural succession and development in northeastern Iowa forests.

Other areas will be farm forestry demonstrations with emphasis on forestry methods of immediate value to farmers and woodland owners. These will include methods of reproducing, growing, and harvesting stands of timber; logging methods and equipment; processing and preserving woodland products; and costs and returns possible under good woodland management. Still other areas will be pure research areas for study of methods of regenerating and producing timber crops, yields, costs and returns, growth and field methods of controlling forest diseases and insect pests.

The tract has been in timber as far back as local residents can recollect. Located six miles southeast of Delhi, most of it is covered with hickory, northern red oak, black oak, northern pin oak, white oak, and elm. A bottomland portion contains cherry, cottonwood, elm, black oak, hackberry, and basswood. A third portion has bur oak and eastern red cedar as the principal trees.

Olympia City Forest Dedicated

During the Olympia, Wash. Centennial, May 1 to 7, the City of Olympia will officially dedicate its city forest, comprising 450 acres of woodland and 420 acres of other land suited to timber growth at the Olympia Airport. When the airport lands were turned over to the city by the Army, with provisions for reactivation if necessary in the event of an emergency, the city commissioner was interested in putting the forest areas under good management. A preliminary survey was made in the spring of 1949 by Walter G. Thompson and Ashley Poust of the U. S. Forest Service and Eugene A. Hofsted, Jr., farm forester for the state extension service. A management plan was drawn up and accepted by the city commissioner. Management activities are expected to start this spring.

Brannan Names Members of National Forest Board of Appeals

Membership of the new National Forest Advisory Board of Appeals, established by order of the Secretary last January to advise him on any appeals from administrative decisions involving public use of the national forests are: John C. Bagwell, chairman, chief of Production and Adjustment Division, Office of the Solicitor; George R. Phillips, member of the staff in the Office of the Secretary of Agriculture, dealing with land and water use, management and conservation; Edward G. Grest, chief, Land Management Division, Soil Conservation Service; Dr. Stanley B. Fracker, research coordinator, Agricultural Research Administration, and John A. Goe, chief of Wool Division, Livestock Branch, Production and Marketing Administration.

Under existing regulations, users of national forest lands, such as grazing permittees, purchasers of timber, and holders of other permits, may appeal to the Secretary from decisions of the chief of the Forest Service affecting their operations. On written request from the appellant the Secretary will refer the appeal to the Board, which will consider the appeal on its merits and furnish its advice and recommendations to the Secretary. Appellants may appear before the Board if they so desire.

Man-Caused Fires Reach Post War Low

Man-caused fires on national forests last year reached a post-war low despite heavy public use of forests and tinder dry conditions that increased fire hazards in the Far West.

Except for 1945, when gas rationing curbed public use of national forests, last year's record of 5,429 man-caused fires on national forests was a 16-year low. Severe lightning storms caused the total number of fires on national forests to increase from 8,332 in 1948 to 11,501 in 1949.

GROW TREES
FOR XMAS TREES AND FORESTRY
Fir, Pine and Spruce in Variety
Seedlings and Transplants
Write for Price List
Suncrest Evergreen Nurseries
P. O. Box. 643, Johnstown, Pa.

P. T. COOLIDGE
TIMBER ESTIMATES
SURVEYING
FORESTRY PRACTICE
FARM VALUATION
31 Central Street, Bangor, Maine

Consulting Foresters
Professional Services Offered by
Members of the Society of American Foresters

Mississippi Delta
Managing Bottomland Hardwoods

Gulf States
Managing Slash and Longleaf

AT HOME IN DELTA HARDWOODS

KEITH CRANSTON
TIMBER ESTIMATING SERVICES
Tel.: 651 Leland, Mississippi
Counsel for Mill Company and Private Landowners

FOREST APPRAISALS FOREST TAXATION
GROWTH AND MANAGEMENT PLANS
FRANK J. LEMIEUX
Consulting Forester
25 Years' Experience in North and South America
734 WHITNEY BLDG., NEW ORLEANS 12, LA.

In Oregon, Washington and California—
BIGLEY & FEISS *Foresters, inc.*
283 Medical Center Bldg.
Eugene, Oregon
Timber Management, Sales and Purchase

Reforestation Arboriculture
S. GAYLEY ATKINSON
Consulting Forester
ROSLYN PENNSYLVANIA

Timber Cruising — Appraisals — Forest Inventory
"We know the Pacific Northwest"
PERRY O. DONALDSON
& ASSOCIATES
Consulting Foresters
Rust Bldg. Tacoma 2, Washington
Telephone BRoadway 4559

Forestry Consulting Services
Forest Management—Forest Products
Watershed Management
HARVEY J. LOUGHEAD
15 East Forest Rd., Biltmore Station
Asheville, N. C.

Complete Professional Service
WILLIAM A. EASTMAN, JR.
CONSULTING FORESTER
Telephone SEneca 2014
410 J. Green Bldg. SEATTLE 1, WASH.

Southern Industry Plants 45 Million Seedlings A Year

With 425 professional foresters on their payrolls, pulp and paper companies are the largest employers of foresters in the South, according to F. C. Gragg, of International Paper Company's Georgetown, S. C., division.

Land in pulp and paper ownership in the South is as well and as intensively managed and protected as any other similar acreage in the region," Mr. Gragg declared in a report to the American Pulpwood Association in New York, Feb. 21.

Pulp and paper companies now own 8 million acres of forestland in the 11 Southern states, Mr. Gragg continued, and control another million acres. The industry currently accounts for about 13 percent of the total forest drain in the region.

"The industry is now planting on fee lands at the rate of 45 million seedlings a year," he declared. "It is also providing 12 million free seedlings to private landowners. Pulp and paper companies plant at least one seedling for every two trees harvested for pulpwood."

Tree Mowing Machine

The Bushwacker, "a mowing machine for trees," is now in production by the American Steel Dredge Company Inc., Fort Wayne, Ind. The production model evolved from five machines that have been built and operated during the past six years.

THE RENOWNED
C. H. Rich Forest Fire Fighting Tool
Write for Prices and Descriptions
Geneva Rich Bickel WOOLRICH, PA.

20 Million Trees a year
Seedlings for Forest and Christmas Tree Plantings. Complete line. As low as $10.00 per 1,000.
Strong, sturdy, well-rooted seedlings and transplants for Conservationists, Timber Operators, or owners of idle land. MUSSER TREES ARE GROWING IN ALL 48 STATES.
For special Xmas Tree Growers' folder and complete Planting Stock Price List, Write Box 26-D
MUSSER FORESTS, INC., Indiana, Pa.

Montana School of Public and Private Administration

The University of Montana has completed its fifth annual School of Public and Private Administration. Given at the School of Forestry, it is offered to all public and private administrators who are interested in the management of forests, range, watersheds, and other natural resources. The course provides concentrated instruction in the elements of administration with staff members from the schools of Forestry, Journalism, Business Administration Sociology and English participating and the departments of Psychology. The 1950 course extended from January 30 to February 24 with eight states represented. During the five years the school has been in existence, it has trained participants from private industry, the National Park Service, the U. S. Forest Service, and this year the Soil Conservation Service.

Redwoods Tree Farm Program

Redwood region tree farms will be sponsored and certified by the California Redwood Association. In announcing the details of the tree farm program adopted by the directors of the association, President Otis R. Johnson pointed out that this venture in formally certified tree farms is new for the redwood region. Certificates will be available to non-members of the association as well as members. There will be no limit in area. While the association will have the direct responsibility of certifying tree farms in the redwood region, it will work in close cooperation with the State Division of Forestry, various academic and research agencies interested in the better protection and utilization of our forest resources, other certifying organizations, the California Forest Protective Association and the American Forest Products Industries, Inc.

CHEMICAL COOKING before grinding is key to success of new "chemigroundwood" process revealed by New York State College of Forestry, Syracuse, as first commercial method of getting good, cheap paper pulp from hardwoods. Here Prof. Frederic W. O'Neil puts logs in cooking vessel, first step in process which will change the logs to quality pulp for less than $40 a ton. Most paper is now made from ground softwood pulp costing $65 a ton.

Land and Water Policies Discussed at Wildlife Meeting

The 15th North American Wildlife Conference in San Francisco, March 6-8, was one of the largest ever held, with an attendance in excess of one thousand.

As has been customary in recent years, considerable attention was given to problems of forestry, soil conservation, range management, and wild land management in general.

A general session devoted to land and water policies attracted a large audience. Chairman of this session was Dr. Wilson Compton, president of Washington State College. Henry Clepper served as discussion leader. Other foresters participating were Reed W. Bailey of the Intermountain Forest and Range Experiment Station and L. A. Stoddart of Utah State Agricultural College.

The various technical sessions had several foresters on their programs, including Earl C. O'Roke of the University of Michigan; Clifford C. Presnall of the Fish and Wildlife Service; Lee E. Yeager of the Cooperative Wildlife Research Unit at Ft. Collins, Colo.; and George H. Kelker of Utah State Agricultural College.

In connection with this conference there was a meeting of the Society of American Foresters division of Forest-Wildlife Management, a report of which appears in the Society Affairs section of this issue.

Another related meeting was held by the Natural Resources Council of America with which the Society of American Foresters is affiliated. Henry Clepper, vice chairman of the Council, presided at this meeting.

These annual North American wildlife conferences are sponsored by the Wildlife Management Institute of Washington, D. C. Dr. Ira N. Gabrielson is president, and C. R. Gutermuth is vice president of the institute.

New Lightweight Portable Pump

A new light-weight, self-priming portable pump, rated at 15,000 gallons per hour, and with a 28-foot suction lift, has been announced by McCulloch Motors Corp., Los Angeles, Calif. Made of cast aluminum it is reported to weight about half as much as other pumps of the same capacity. It is equipped with a 5-horsepower engine, kick-proof automatic-rewind starter, rainproof ignition, and automatic governor.

Range Society Section Formed By Arizona Group

Members of the American Society of Range Management residing in Arizona met in Tucson on March 11 to form a local section of the society. A constitution and bylaws were accepted.

Officers elected were: Dr. R. R. Humphrey, range ecologist, University of Arizona, chairman; and Matt Baird, operator, Ruby Star Ranch, Tucson, vice-chairman. A. L. Brown, assistant range ecologist, University of Arizona was appointed temporary secretary. Council members are: George Glendening, U. S. Forest Service, Tucson; O. N. Arrington, State Game and Fish Department, Phoenix; Herbert Metzger, rancher, Cottonwood; Paul Buss, Indian Service, San Carlos; and A. L. Brown, University of Arizona.

Pennsylvania Group Backs State Civil Service

In a resolution adopted at its 63rd annual meeting, the Pennsylvania Forestry Association called for the placement of all state forestry officials in Pennsylvania under civil service.

The meeting which was held in Harrisburg, Pa. on March 18 also went on record as supporting Hoover Commission recommendations for the grouping of federal forestry and grazing activities within the U. S. Department of Agriculture; placing state forest lands under active management for continuous yields; establishment of roadless wild areas within the state; and initiation of a definite federal program of research on oak wilt.

Cutting Practice Regulation Proposed for New York State

A bill has been introduced in the New York State Assembly to amend the state conservation law by providing for the issuance of selective cutting permits by district foresters. Under the proposed law, district foresters may require selective cutting, effective stocking, and "such other measures as may be necessary." Any owner or operator in the state desiring to cut a merchantable stand of timber during any year would have to obtain written permission for a district forester, based on his written application. Permits would expire at the end of one year, but would be renewable if no violations had occurred. Violations would be punishable by fines of not less than $200 nor more than $500, each day of violation constituting a separate offense.

Lead Arsenate for Pine Weevil

Lead arsenate spray still seems to be the best control for white pine weevil in Wisconsin, according to entomologists at the University of Wisconsin.

About 45,000 pines were sprayed with lead arsenate in the pine plantation at Hartman Creek fish hatchery in 1948. Check-ups showed fewer than one in a hundred sprayed trees were damaged by weevils. In an unsprayed planting nearby, 21 of 100 trees were infested by weevil.

The men started spraying April 14, with knapsack sprayers. The concentrated spray mix was 9.5 pints of water, 1 pound of lead arsenate, 4 fluid ounces of linseed oil, 95 drops of Grasselli wetter-spreader.

Valley Authorities Discussed

The Chamber of Commerce of the United States has published a special number of its daily *Governmental Affairs*, which deals with the valley authority approach to resources management and business economics. Since current emphasis in the valley authority movement is directed toward the establishment of a plan for the Columbia Valley, the CVA bill is briefly but rather thoroughly discussed. Copies of the special number may be obtained from the Chamber's headquarters office, Washington 6, D. C.

Information

THAT PUTS THE FINGER ON THE SOURCE OF SUPPLY

AERIAL PHOTOS

SAVE TIME
SAVE MONEY
SAVE EFFORT

IMPROVE TYPING
SPEED MAPPING
AID ENGINEERING
HELP FIREFIGHTING
ASSESS DAMAGE
PROVE OWNERSHIP
RECORD CONDITIONS

A FORESTER

is worth more to his organization through knowledge of aerial photo use

Can we aid you in western Timber areas?

DELANO AERIAL SURVEYS
1536 S. E. 11TH AVENUE
PORTLAND 14, OREGON

Southern Shade Tree Conference

The Southern Chapter of the National Shade Tree Conference met at Wilmington, N. C., March 23-25. It was the tenth and largest meeting of the southern conference, with over 100 registered, and certainly one of the best. The conference is made up of commercial arborists, scientific workers, park officials, foresters, and others whose work has to do with trees.

Papers were given on aspects of commercial shade tree work, on diseases, insects, the proper choice of trees, tree physiology, and other subjects. Speakers included Prof. P. J. Kramer of Duke University, Prof. R. J. Preston of the N. C. State College, Dr. Curtis May and Norman Armstrong, both past presidents of the National Shade Tree Conference, and eight other prominent authorities. Dr. H. S. Newins of the University of Florida was president and presided. Fred H. Claridge, of the N. C. Forest Service, was toastmaster at the banquet. Dr. George H. Hepting of Asheville, N. C., was the general chairman of the meeting.

The meeting included an entire afternoon's display of power saws, drills, chisels, mist blowers, and other equipment. Wilmington's azaleas were at their height and the group visited Greenfield Lake, Airlee Estate, and Orton Plantation.

The new officers elected were C. M. Blume of Houston, Texas, president; E. T. Halter of Palm Beach, Fla., vice president; and H. C. Wilson of Shelby, N. C. secretary.

The National Shade Tree Conference has many foresters in its membership and would welcome more. Anyone interested should get in touch with a member or with Dr. L. C. Chadwick, Department of Horticulture, Ohio State University, Columbus, Ohio.

Coast Industries Group Meets

At its first 1950 dinner at Fort Bragg, Calif., Coast Forest Industries devoted its program to discussions of plywood. Edward Brattain of Coast Plywood Manufacturing Co. and Wayne Phillips of Industrial Plywood Corp. spoke on plywood manufacture and peeler log grading.

The organization, which was formed in 1948 by loggers, millmen, timber owners, and foresters, meets quarterly in various communities in the central redwood region. Officers of the group are John D. Riley, president, Union Lumber Co., Kelly B. McGuire, vice-president, Caspar Lumber Co., George J. Rau, secretary-treasurer, California Division of Forestry.

New Jersey Conservation School

Teachers, prospective teachers, camp counselors, nature specialists, and playground directors will participate this summer in a program operated by the New Jersey State Department of Education in cooperation with the Department of Conservation and Economic Development. The project, known as the New Jersey State School of Conservation, will open its first session on June 4 and will continue until the completion of the sixth session on September 9. Courses include camp leadership, conservation education, water safety and first aid, camping education, field studies in science, and rural sociology. College credit is given for completion of the several units. Site of the school is Lake Wapalanne on the Stokes State Forest in Sussex County.

Included among the visiting faculty are C. P. Wilber, state forester; F. I. Dewald, chief, Bureau of State Forests; L. M. Lindenmuth, deputy chief, Bureau of State Forests; and W. J. Seidel, state fire warden.

In addition to the field training for teachers and leaders, the School of Conservation also offers a conservation camp for children, Camp Wapalanne. For information write to State Teachers College, Montclair, N. J.

Van Giesen, Personnel Chief

Chester L. Van Giesen has been appointed regional personnel officer of the North Central Region, U. S. Forest Service, Milwaukee, Wisc. He succeeds John B. Taylor who retired at the end of 1949.

Van Giesen was born at Cayuga, New York. He received his bachelor's and master's degrees in forestry from the New York State College of Forestry in 1924 and 1925, and joined the U. S. Forest Service, June 1, 1925, on the Routt National Forest in Colorado. From there he served in various capacities from forest ranger to supervisor on the Gunnison, Bighorn, Roosevelt, and Nebraska national forests.

In 1935 Van Giesen came to the North Central Region as supervisor of the Chequamegon National Forest in Wisconsin.

In World War II he entered the Army and was discharged in May 1946, receiving several citations for his overseas work with the Corps of Engineers. He returned to the region as assistant chief of the division of timber management, and became chief of the division of recreation, lands and wildlife in June 1947.

Industrial Scholarship Winners

Winners of the competitive $400, ten-week summer research scholarships sponsored by National Lumber Manufacturers Association are: John H. Brown, Michigan State College, East Lansing, Mich.; Craig C. Campbell, Duke University, Durham, N. C.; Thomas A. Foley, Purdue University, Lafayette, Ind.; and Richard W. Pettersen, University of Washington, Seattle, Wash.

The winners were chosen from an outstanding group of twenty nominees. Each accredited or listed school of forestry in the country was entitled to nominate one candidate. Awards were made on the basis of individual and scholastic qualifications and on the recommendations of the deans or department heads.

The four winners will receive training in the Timber Engineering Company Laboratory, Washington, D. C.

Forest Service Will Charge On Some Recreational Areas

The recreational use charge initiated in 1949 on some of the larger recreation areas in the national forests will be continued on an experimental basis this year. Charges will be the same as last year. Campers will pay 50 cents a day or $3 a week for a car party of not more than six persons. Picnickers will pay 50 cents for a party of not more than six. Where swimming facilities exist, the entrance fee will include swimming at no additional cost except fees for clothes lockers.

Two Thousand Take Short Course

The 2,000th student was graduated from the Illinois Central forestry short course recently in ceremonies held at Mize, Miss. with E. B. Livingston of the Mississippi Forest Service giving the commencement address.

The course is taught by J. G. Guthrie, Illinois Central Railroad forestry agent and is designed to teach the basic fundamentals of forest practices, that graduates may be better able to use trees as one of the farm cash crops. The instruction consists of about six hours of class room study and six hours of practical study in the woods.

This novel course has been taught to veteran farm trainees, vocational agricultural classes, and other groups throughout Mississippi and Louisiana by three Illinois Central forestry agents.

Wisconsin Seeks Simplicity

A total of 39 unrelated state, federal, and private agencies are dealing with various phases of conservation in Wisconsin, spending about $16,000,000 last year, and aiming at a widely varied list of objectives, according to Ernest Swift, state conservation director. A survey of the many agencies influencing conservation developments is reported in an 80-page bulletin. He recommends a state coordinating council which would bring all conservation agencies working in Wisconsin into closer harmony and prevent conflicting activities wherever possible.

The report covers the activities of 8 federal, 26 state, and 5 municipal and private agencies and departments, with the University of Wisconsin represented by 15 separate cooperators. Federal agencies include the Soil Conservation Service, the Upper Mississippi Valley Soil Conservation Experiment Station, Production and Marketing Administration, Geological Survey, Forest Service, Lake States Forest Experiment Station, Indian Service, and the Fish and Wildlife Service.

The combined agencies supervised about 2,000 man-years of work in 1949 and managed almost 6,000,000 acres of land in the state. About half the money spent was from the federal government, and over 40 percent of the total expended went into soil conservation activities, with forests and wildlife each getting about 18 percent of the total.

The report recommends consolidation of the 3 divisions of the conservation department dealing with forests, legislation on water use and marsh drainage, removal of bounties on predatory animals, reduction of artificial deer feeding and deer damage payments, increase in funds for soil conservation work, expansion of conservation education activities, and other needs.

Small Logs Bought by Weight

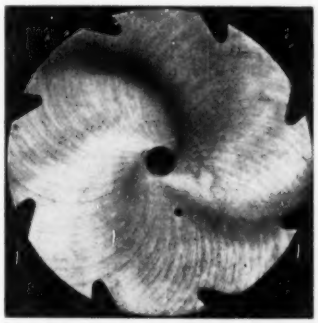
Biles-Coleman Lumber Co., of Omak Wash., is operating a lodgepole pine mill in connection with its large ponderosa pine plant, and Emmit Aston, manager of the company's logging department has installed scales for weighing small lodgepole logs. The company will buy few or many logs, depending upon what the farmer is able to bring to the mill along with his butter and eggs. It is believed that the possibility of sale of small material in this manner will aid the practice of forestry on small holdings.

Knoth in Philippines

Robert F. Knoth of the consulting firm, Robert F. Knoth and Co. of Charleston, S. C. is now in the Philippine Islands making a detailed timber estimate of a 30,000-acre tract. During the past 15 years, Knoth has traveled extensively making timber examinations in Central America, Mexico, and Africa for both American and foreign clients.

New Blade Saves Power Costs

A basically new type of circular saw blade developed in post-war Germany to reduce the hazards of circular-sawing may revolutionize modern circular sawing.



CUT CONTROL SAW BLADE

The Cut-Control Saw Blade differs from conventional circular saw blades in that it has only a limited number of carbide-tipped teeth (usually 8) spaced at considerable intervals around the periphery of the blade. This unique design is found to offer many definite advantages to all users of circular saw blades. These include: Elimination of the danger of kick-back injuries; minimizing greatly the effect of hand cuts when hands contact the blade; increasing greatly the life of the saw and decreasing the frequency of sharpening. (An American factory test showed over 2,036 hours of use before sharpening was required); a power saving of from 30 to 40 percent; an improved quality cut; a great reduction in the noise of the blade due to fewer and smaller teeth; produces chips, which are of more value, rather than sawdust; simpler to sharpen; and blade can be run in reverse, which creates an almost automatic feed.

The blade was introduced in Europe early in 1949 and has been thoroughly tested there in woodworking plants, schools, and universities with unanimously favorable reports. In addition, it has been production-tested by Gamble Brothers of Louisville, Ky. The Forest Products Laboratory and the Timber Engineering Company Laboratory have also tested the blade for kick-back safety and power saving.

Forestry Committee in Great Plains to Coordinate Activities

A Great Plains Forestry Committee has been organized to assemble information, coordinate activities, and promote forestry in the Great Plains. Members are W. V. Lambert, chairman, dean of Agriculture, University of Nebraska; Paul Roberts, assistant regional forester, U. S. Forest Service; A. D. Folweiler, director, Texas Forest Service; W. G. McGinnies, director, Rocky Mountain Forest and Range Experiment Station; H. P. Ridgow, extension forester of Oklahoma; S. A. McCrovy, Department of Horticulture and Forestry, South Dakota State College; Ross Williams, dean of forestry, Montana University; H. C. Hildreth, superintendent, Central Plains Experiment Station; Ernest George, superintendent, Northern Plains Experiment Station; Harry C. Woodward, state forester, South Dakota. The following subcommittees have been established: (1) Development; (2) Resources and needs; (3) Organization and relations; (4) Education and (5) Research.

Recreational Use of Forests Reaches All-Time Peak

National forest recreation use for 1949 reached an all-time record of 26,080,255 visits, an increase of 9 percent over 1948. Each year since 1945 has shown an increase over the preceding year.

The length of time that recreationists spent on the forest for each visit remained about the same as in previous years. The 26,080,255 visits represented 37,538,283 man-days of recreation use. Use of camp and picnic areas, which totaled 11,496,244 visits, increased 14 percent over 1948.

Use of winter sports areas slumped 25 percent during 1949 as compared with the preceding year. These areas had 1,712,607 visits by sports enthusiasts. The decrease in use of winter sports areas was largely due to the unusually severe weather in the West during the early part of 1949.

Recreational use of unimproved national forest areas for hunting, fishing, hiking, wilderness travel, and similar activities showed a 13 percent increase and totaled 9,940,259 visits.

FORESTRY TERMINOLOGY

Available in June!
New Revised, Enlarged
1950 Edition

A Glossary of Technical Terms Used in Forestry

The **FORESTRY TERMINOLOGY** is the latest, most complete glossary of forestry terms extant. Included are definitions of all the terms that the practicing forester uses in his daily work and encounters in forestry literature. A *must* for every forester's desk or library.

Price, $3
Postpaid

SOCIETY OF AMERICAN FORESTERS
825 Mills Bldg., 17th St. and Pennsylvania Ave., N. W.
WASHINGTON 6, D. C.

Carry a plane table
in your hand . . . . . .

Make good maps with a hand compass and pacing. Do your mapping-engineering with "the pocket plane table."

THE REINHARDT REDY-MAPPER $4.95
Pat. Pend. Postpaid

Eliminates calculations, scales, alidade, tripod, paper. SIMPLE, accurate, graphic, durable.

THE WOODSMAN TOOL CO.
Gravelly Lake, South Tacoma 9, Wash.

A Concise Encyclopedia of

WORLD TIMBERS

By F. H. TITMUSS

A USEFUL WORK of reference for all users of timber, containing detailed descriptions of nearly 200 different timbers, with microscopic identifications of the woods in more common use. $4.75

PHILOSOPHICAL LIBRARY, Publishers,
15 E. 40th ST., DEPT. 350, NEW YORK 16, N. Y.

INCREMENT HAMMERS

MADE IN
MORA, SWEDEN

- Accurate
- Fast
- Sturdy
- Weighs 13 oz.
- 10" long

Designed for quick, easy examination of bark and recent tree growth. Use like a hammer and extract ⅛" core *instantly*. A time-saver in selective cutting operations. Your free copy of our Forester's Tool Catalog is yours for the asking. Write Dept. J.

$12.85 EACH POSTPAID—SORRY! NO C.O.D.'s

SANDVIK
SAW & TOOL CORPORATION
47 WARREN STREET NEW YORK 7, N. Y.

CONSERVATION NOW--
OR DISASTER TOMORROW

WESTERN LAND
and
WATER USE

by
MONT H. SAUNDERSON

IS THE Promised Land of the West headed for a permanent drought that will render useless its once verdant soil? Mont H. Saunderson pulls no punches in baring present abuses, and he proposes stringent measures for control of dwindling land and water resources now facing Westerners. A vital book for every conservationist, forester, and farmer.

Illustrated, $3.75

At all bookstores, or
UNIVERSITY OF OKLAHOMA PRESS
NORMAN, OKLAHOMA

SOUTHERN GLO TIMBER MARKING PAINT

White — Yellow — Red — Blue
Prices on these colors for immediate shipment.

Paste in 5 gallon cans	$1.45 gal.
Ready Mixed 5 gallon cans	1.30 gal.
1 gal. cans—4 to a case	.15 more/gal.

Order direct from factory.
All prices f.o.b. Sumter, S. C.

SOUTHERN COATINGS AND CHEMICAL COMPANY
SUMTER, SOUTH CAROLINA

SEEDS FOR NURSERYMEN

TREE — SHRUB — PERENNIAL —
FLOWER — VEGETABLE

Correspondence with Seed Collectors Invited

HERBST BROTHERS
Established 1876

92 WARREN STREET NEW YORK 7, N. Y.

NEW TREE TRIMMING SAW

Makes *fast-clean-easy* cuts and is easy to file.

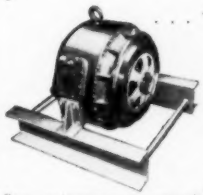
No. 124B

Unique design allows teeth to cut full length of blade.

PRICE 5.30 ea. Delivered in U. S. A.

Write for Free Catalog of Tree Trimming Tools and Supplies

BARTLETT MFG. CO.
3015 E. Grand Blvd. Detroit, Mich.



. . . TWO IN ONE

TORCON

TORQUE CONVERTER AND HYDRAULIC COUPLING

Simple Construction—Extremely rugged—Easy maintenance—Completely hydraulic—No mechanical connection—Automatic adjustment—No pressure on oil seals—Minimizes load shocks—Self-lubricating—Hydraulic fluid—SAE 10 Turbine Oil

For Information Write

C. M. LOVSTED & CO., INC.
2202 First Ave. South, Seattle 4, Wash.
Branch Offices in Los Angeles, Calif., San Francisco, Calif., Vancouver, B.C., Honolulu, Hawaii, Manila, P.I.

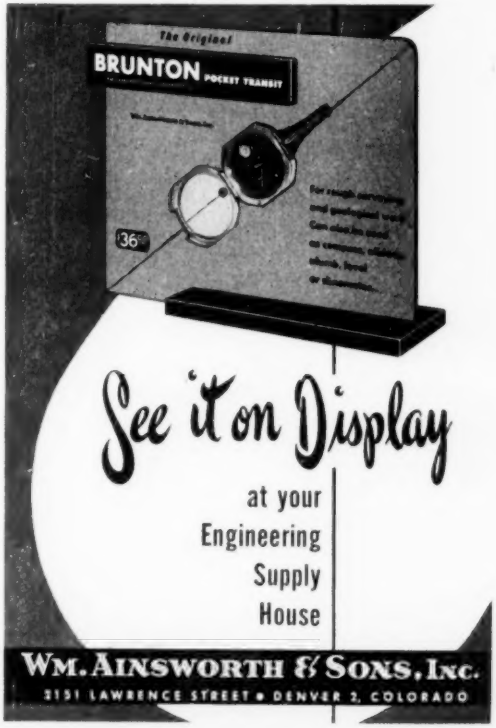
PLANTING BARS
COUNCIL'S
OST PATTERN

FIRE RAKES
and SWATTERS

BRUSH HOOKS,
BANK BLADES,
THINNING AXES,

POISONING AXES

THE COUNCIL TOOL CO.
MAKERS
WANANISH, N. C.



See it on Display

at your
Engineering
Supply
House

WM. AINSWORTH & SONS, INC.
2151 LAWRENCE STREET • DENVER 2, COLORADO

MINNESOTA AND ONTARIO PAPER COMPANY

MANUFACTURERS

NEWSPRINT—KRAFT CONVERTING—GROUNDWOOD PRINTING PAPERS—PULP

POLES—CROSS TIES—FOREST PRODUCT PRESERVATIVE TREATMENT

INSULITE

(STRUCTURAL INSULATION)

PLANTS AT
INTERNATIONAL FALLS, MINN.
FORT FRANCES, ONTARIO
KENORA, ONTARIO
SPOKANE, WASH.
MINNEAPOLIS, MINN.

GENERAL OFFICES
500 BAKER ARCADE BUILDING
MINNEAPOLIS 2, MINNESOTA

PLEASE ADDRESS REPLY TO
INTERNATIONAL FALLS, MINN.

Mr. Lloyd Thorpe
Advertising Representative
Journal of Forestry
209 Seneca
Seattle 4, Washington

Dear Mr. Thorpe:

In my affiliation with the Forestry Department of a large pulpwood producing and pulpwood consuming company, I, as well as other members of the staff of the department, find it necessary to make recommendations on the purchase of a considerable variety of equipment. Such equipment consists of various types of logging equipment, cruising and surveying equipment, forest fire fighting tools and other supplies and equipment of a like nature.

It is with a great deal of interest that we find that the national advertising medium provided by the Journal of Forestry is being used more and more by the suppliers of the various types of equipment which we need. If this development continues and more advertisers make use of this medium I think they will find that they are reaching a market which they could contact by no other means.

I am sure that if this development continues the men who make the recommendations and do the purchasing for this company will come to rely a great deal on the advertising which appears in the Journal.

Very truly yours,

G. B. Amidon

G. B. Amidon
FOREST MANAGEMENT OFFICER

GBA'lb

This is one of a series of advertisements published by the Society of American Foresters for the purpose of acquainting the membership with the advertising potentialities of their JOURNAL OF FORESTRY.

Lift it with your little finger!

Incredible! You'll say so yourself when you first lift a McCulloch 3-25 *one-man* chain saw. You'll be even more surprised when you saw with it. How that little yellow fellow can cut!

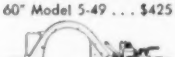
Light and Fast Cutting Judging by the way the McCulloch 3-25 cuts, you'd think it should weigh 40 to 50 lbs. The fact that it doesn't—that it weighs only 25 lbs.—is a tribute to McCulloch engineering.

THERE'S A McCULLOCH FOR EVERY TIMBER-CUTTING JOB

20" Model 5-49 . . . $385
30" Model 5-49 . . . $395
40" Model 5-49 . . . $405
50" Model 5-49 . . . $415

18" Model 3-25 . . . $295
24" Model 3-25 . . . $305
30" Model 3-25 . . . $315

60" Model 5-49 . . . $425



20" 5-49 Bow Saw . . . $425

15" 3-25 Bow Saw . . . $325

All prices f.o.b. Los Angeles

3-25 HAS EVERY FEATURE

★ 3 hp. ★ 25 lbs. weight, complete with 18" blade and chain ★ Automatic clutch ★ Built-in chain oiler ★ Full-power sawing at any angle ★ Kickproof rewind starter ★ Easily accessible ignition points ★ One-hand controls

NATIONWIDE SALES AND SERVICE

SEND FOR FREE LITERATURE AND NAME OF NEAREST DEALER

McCULLOCH MOTORS Corporation

6101 West Century Blvd., Los Angeles 45, Calif.

New McGRAW-HILL Books

INTRODUCTION TO AMERICAN FORESTRY. New 2nd Edition

By Shirley W. Allen, University of Michigan. *American Forestry Series.* In press

A revision of a well-known college text, brought fully up to date, with new material on forest policy, forest-planting, methods of fire, insect, and disease control, mechanization of logging and other timber harvesting, and state and national forestry planning.

FOREST MENSURATION. New 3rd Edition

By Donald Bruce, Consulting Forester, Portland, Oregon, and Francis X. Schumacher, Duke University. *American Forestry Series.* In press

The fundamental concept of this text is based on a belief of the authors that the best way to teach forest mensuration is to teach the student how to use its tools. The arrangement of material follows a classification of the technique required, rather than the subject to be studied. All common problems of mensuration are illustrated by modern practices, and a chapter has been added on the mensurational phases of using aerial photographs in timber cruising.

FOREST PATHOLOGY. New 2nd Edition

By John S. Boyce, Department of Forestry, Yale University. *American Forestry Series.* 526 pages, $6.00

This successful book has been thoroughly revised. Much of it has been entirely rewritten to include a wealth of information on such topics as salt spray injury, Phymatotrichum root rot, phloem necrosis of elm, Adelopus needle cast of Douglas fir, septoria canker of poplars, canker stain of plane tree, oak wilt, mimosa wilt, persimmon wilt, and several other rots. New material has been included on the prevention and control of the deterioration of wood in service.

FOREST PRODUCTS. Their Sources, Production, and Utilization

By A. J. Panshin, Michigan State College; E. S. Harrar, Duke University; W. J. Baker and P. B. Proctor, Oregon Forest Products Laboratory. 549 pages, $6.00

Placing special emphasis on all recent developments and trends in forest products conversion and utilization, this book deals with the principal primary and secondary forest products with the exception of construction lumber. The four major sections of the text treat the economics of forest utilization, wood products, chemically derived products from wood, and derived and miscellaneous wood products.

Send for copies on approval

McGRAW-HILL BOOK COMPANY, INC.

330 WEST 42ND STREET, NEW YORK 18, N. Y.